AIR & SPACE POWER

POWER JOURNAL
Summer 2008

TO FLY AND FIGHT IN AIR, SPACE, AND CYBERSPACE

1. REPORT DATE **2008**	2. REPORT TYPE	3. DATES COVERED **00-00-2008 to 00-00-2008**
4. TITLE AND SUBTITLE **Air & Space Power Journal Summer 2008**		5a. CONTRACT NUMBER
		5b. GRANT NUMBER
		5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)		5d. PROJECT NUMBER
		5e. TASK NUMBER
		5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Air & Space Power Journal,401 Chennault Circle,Maxwell AFB,AL,36112-6428**		8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**131**	

The Air and Space Power Journal (ISSN 1554-2505), Air Force Recurring Publication 10-1, published quarterly, is the professional journal of the United States Air Force. It is designed to serve as an open forum for the presentation and stimulation of innovative thinking on military doctrine, strategy, force structure, readiness, and other matters of national defense. The views and opinions expressed or implied in the Journal are those of the authors and should not be construed as carrying the official sanction of the Department of Defense, Air Force, Air Education and Training Command, Air University, or other agencies or departments of the US government.

Articles in this edition may be reproduced in whole or in part without permission. If they are reproduced, the Air and Space Power Journal requests a courtesy line.

Senior Leader Perspectives

Focus Area

Features

Departments

Prelaunch Notes

Ricochets and Replies 23

The Merge

PIREPs

Quick Look

Book Reviews

A House Divided

The Indivisibility of Intelligence, Surveillance, and Reconnaissance

Lt Gen David A. Deptula, USAF
Maj R. Greg Brown, USAF

Through technological advances and Airmen's ingenuity, we can now surveil or strike any target anywhere on the face of the Earth, day or night, in any weather. A more challenging issue today—and for the future—is determining and locating the desired effect we want to achieve. Because ISR capabilities are at the core of determining these desired effects, ISR has never been more important during our 60 years as an independent service. ISR has become the foundation of Global Vigilance, Reach, and Power.

—Gen T. Michael Moseley

WITH THESE WORDS, the chief of staff of the Air Force points out a radical transition in the Air Force view of the relationship among intelligence, surveillance, and reconnaissance (ISR). Just as the operational construct of global vigilance, reach, and power denotes the indivisibility of airpower, so can we best understand its foundation through the inherent interdependence of its parts—ISR is indivisible.[1]

How can one make such an assertion? Certainly, throughout Air Force history the service has always experienced some degree of separation among intelligence, surveillance, and reconnaissance—organizationally, programmatically, and culturally. Indivisibility has to do with principles, not feasibility. In our Pledge of Allegiance, when we assert the indivisibility of our nation, we address the cultural memory of a catastrophic Civil War. Indivisibility does not mean that division is not conceivable; instead, it is the realization that division destroys the synergistic effects that unity provides.

ISR is indivisible because the effects it provides depend upon the synchronization and

integration of the intelligence, surveillance, and reconnaissance activities. That is the principle. Intelligence relies on surveillance and reconnaissance for its data and information. Conversely, we do not know what to surveil, where to reconnoiter, or when to do either without intelligence. The data collected depends upon processing and exploitation common to all three activities. Decision makers do not care much about the *who* and *how* behind their intelligence. No one is asking for separate "I," "S," and "R" streams on different displays or in different formats—they are expecting integrated products on identical timelines.

In a speech delivered in 1858, Abraham Lincoln cited a New Testament verse: "A house divided against itself cannot stand."[2] This is true of the internal Air Force's view of ISR, and, to cite Lincoln once again, we cannot wait for it to "cease, until a *crisis* shall have been reached, and passed" (emphasis in original).[3] As an Air Force, we need to get our own house in order if we wish to optimally present ISR capabilities to decision makers. To do so, Airmen must realize, accept, and act on the principle that ISR is indivisible. Such indivisibility rests on four tenets: first, ISR is operations; second, ISR denotes synchronization and integration; third, ISR is domain neutral; and fourth, ISR is about capabilities and effects, not personnel, platforms, and culture. This article addresses each tenet in turn, but first we would do well to review how we came to be where we are now.

Why Intelligence, Surveillance, and Reconnaissance?

The indivisibility of ISR is reflected in the definition of the component terms. The collective term *ISR* first came into common usage in the mid-1990s. Coined by Adm William Owens, who at the time served as vice-chairman of the Joint Chiefs of Staff, integrated ISR was presented as a vital component of the revolution in military affairs, defined by the information age, and implemented through the concept of net-centric warfare. Early in 2001, Secretary of Defense Donald Rumsfeld allegedly asked,

"What is ISR?" When someone explained the abbreviation to him, Rumsfeld supposedly summarized it in his own unique way: reconnaissance is find it; surveillance is keep in touch with it; and intelligence is why you give a damn in the first place.[4] Although this is a pithy way of putting it, accurate understanding requires more detail.

As it turns out, the definitions are easy to find. Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms,* defines "intelligence, surveillance, and reconnaissance" as "an activity that synchronizes and integrates the planning and operation of sensors, assets, and processing, exploitation, and dissemination systems in direct support of current and future operations."[5] These words contain much nuance. Some of the subtleties are positive. For example, "activity" in joint parlance implies a function, mission, or action, as well as the organization that performs it; thus, ISR is functionally and organizationally indivisible.[6] Other subtleties foster misperceptions. "Direct support" accurately reflects the fact that, like all operations, ISR exists to advance the achievement of national security objectives; however, it also implies subordination of ISR to other missions.[7] "Operations" include any national security objective, at any level of conflict, so the term is appropriate; but to many readers, it connotes and perpetuates an artificial distinction between intelligence personnel and those who conduct operations.[8] JP 1-02's definition of ISR as a synergistic whole highlights the interdependence of its components, yet for full understanding, it further defines intelligence, surveillance, and reconnaissance separately to illustrate their distinctive capabilities and different purposes.

Thus, "intelligence" is "the product resulting from the collection, processing, integration, evaluation, analysis, and interpretation of available information concerning foreign nations, hostile or potentially hostile forces or elements, or areas of actual or potential operations. The term is also applied to the activity which results in the product and to the organizations engaged in such activity."[9] The art of intelligence involves rapidly and systematically

analyzing data and information gathered through surveillance and reconnaissance and synthesizing it with existing contextual knowledge to produce accurate assessments needed for informed decision making. The essence of intelligence is improved situational awareness for decision makers. "Effective . . . intelligence results when actionable information derived from a detailed understanding of adversary systems, capabilities, and intentions is delivered in time to make germane planning and operational decisions on how, when, and where to engage enemy forces" to achieve the desired effects.[10]

"Surveillance" is "the systematic observation of aerospace [air, space, and cyberspace], surface, or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means."[11] "Loosely, another variable in the all-encompassing term reconnaissance," surveillance is usually broken out as "a specific function."[12] Surveillance is a sustained process, often passive and not oriented to a specific target. Rather, it is designed to gather information by a collector or series of collectors having timely response and persistent observation capabilities, a long dwell time, and clear, continuous collection capability. Surveillance observations provide data for updated intelligence assessments of enemy activities and threats, thus allowing the detection of changes in enemy operations over time.

Finally, "reconnaissance" is "a mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy" or a potential enemy.[13] Reconnaissance operations are transitory in nature and generally designed to actively collect information against specific targets for a specified time by a collector that does not dwell over the target or in the area. Reconnaissance generally has a time constraint associated with the tasking. Because it seeks to collect information about an adversary, reconnaissance is a fundamental tactic that helps to build an intelligence picture.

Clearly, as defined in the modern context, ISR is an operational function with the goal of providing accurate, relevant, and timely intelligence to decision makers; it is the lifeblood of effective decision making. Together, ISR operations provide decision makers the intelligence and situational awareness necessary to successfully plan, operate, and preserve forces; conserve resources; accomplish campaign objectives; and assess kinetic or nonkinetic effects across the range of national security operations. They are integral to gaining and maintaining decision superiority. Why, then, does the indivisibility of ISR need explanation?

The Roots of Division

ISR has never *been* quite what it is today. The importance of the principle of indivisible ISR reflects how the information age has altered the strategic landscape. The nature of ISR has not changed, but the character has. Information-age warfare differs distinctly from its industrial-age predecessor. Precision has supplanted mass, timing has become compressed, and service interaction has increased. Twenty-first-century demands require that what we once tolerated as related tasks now become a single, integrated process. Battlespace awareness is the effect sought by national-security decision makers. Coordination and interoperability are no longer good enough.

Knowledge is of no greater value today than in the past. Intelligence, gleaned from reconnaissance, has existed since the dawn of warfare. What has changed in the information age is the capability—the realistic expectation—of how data can be assimilated, synthesized, and delivered in time to be useful. As capabilities increase, the inefficiencies of the past are no longer sufficient for the task.

Both of the world wars and the Cold War exemplified industrial-age warfare. The American view of intelligence springs from this legacy. In the industrial-age model, intelligence was a massive, personnel-intensive operation aimed at supporting national and military decision making. Specialization and differentiation followed the demands of technology and a monolithic adversary. Accordingly, in true factory-like, assembly-line form, intelligence, surveillance, and reconnaissance were each individually organized around very

specialized inputs and outputs: take a photograph, process the film, interpret the information, create a picture, write a report, deliver it to the relevant decision maker; intercept a radio transmission, decode it, interpret its meaning, write a message, deliver it. The intelligence cycle was sequential.

In an age when airpower itself was artificially divided between strategic (supporting national or nuclear policy) and tactical (supporting local or conventional combat operations), it comes as no surprise that ISR was similarly divided. Legitimate divisions between the strategic and tactical levels of war became artificially (and incorrectly) synonymous with platforms and weapons. This artificial division of ISR had three consequences: first, it marginalized so-called strategic ISR as irrelevant to tactical military operations; second, we perceived ISR missions as support activities; and third, at the so-called tactical level, it drove a wedge between intelligence on the one hand and surveillance and reconnaissance on the other. Tactically, unit-level intelligence personnel briefed background information from finished intelligence products. Surveillance and reconnaissance personnel reported relevant, updated information of immediate value in raw form not as intelligence, but rather euphemistically as *combat information.*

Radar surveillance of the air domain represents an extreme example of the division of labor typical of industrial-age, task-based organizations. Originally conducted using ground-based radars and revolutionized by the EC-121 Warning Star in Vietnam and its progeny, the E-3 Sentry Airborne Warning and Control System (AWACS), radar early warning located enemy aircraft, warned friendly forces of the threat, and dispatched friendly fighters to engage them. Application of the intelligence gleaned from radar surveillance became known as air battle management (ABM), which provides aircrews enhanced situational awareness, enabling them to plan in advance what tactics they will employ. ABM is decision making at the tactical level; the currency of ABM is intelligence.

Categorizing the product of radar surveillance not by its function (intelligence) but more narrowly by its specific application (ABM) had two effects. First, classification by application ignored the onboard processing and interpretation inherent in determining the information's relevance; somehow, since intelligence personnel did not do the analysis, some did not consider it intelligence. Second, ignoring the core function increased the likelihood of overlooking other potential uses for the information. Put another way, the industrial-age model created artificial distinctions between the intelligence "ends" and surveillance and reconnaissance "ways" of collecting its necessary data.

A compounding factor during the Cold War was the strategic nature of that conflict and the relative "luxury" of squaring off against a monolithic and predictable adversary. After the early decades of the Cold War, strategic surveillance and reconnaissance missions mostly flew periodically on catalogued routes. We had built up a good intelligence knowledge base of the adversary; we knew where he lived; and we knew how he intended to fight. The relatively static nature of strategic surveillance and reconnaissance missions created a perception of intelligence as strategic. For tactical airpower, intelligence for aircrews stopped at the premission brief. Direct, tactical situation updates came from aircrews on the surveillance and reconnaissance mission; they were *operators* because they flew.

Though seemingly trivial, one cannot overstate the institutional importance put on flying. Organizational culture is powerful in large institutions such as the Air Force. Over time, Cold War separatism cemented the perceived organizational bias between *strategic* intelligence *support* and *tactical* surveillance and reconnaissance *operations.* What Airmen wore and where they did their work outweighed the intrinsic, functional relationship among intelligence, surveillance, and reconnaissance.

ISR Is Operations

The paradigm of industrial-age warfare defines operations as putting iron on a target. Attrition is the focus. Accordingly, the Air Force spent most of the last century perfecting precision—the technology, tactics, tech-

niques, and procedures necessary to put iron accurately on any target, anywhere. In the information age, operations have to do with effects. The 1990s evidenced this evolution in a clear elucidation of the *kill chain*—find, fix, track, target, engage, and assess. At least two-thirds of kill-chain operations are ISR; increasingly, the target and engage steps are non-kinetic. Knowledge comes before power, and our asymmetric ISR capabilities are able to achieve effects all on their own.

This is the changed character of ISR. In the modern context, the find and fix links of the kill chain are much more difficult than the engage link, particularly for kinetic operations. The character change is reflected in the first-ever Air Force doctrine for ISR—Air Force Doctrine Document (AFDD) 2-9, *Intelligence, Surveillance, and Reconnaissance Operations*, 17 July 2007. The truth resides in the title—ISR *is* operations. The Air Force did not lump ISR together for its own purposes; in the intended spirit of joint doctrine, AFDD 2-9 uses the ISR definition in JP 1-02.[14]

ISR efforts today make up the vast majority of the operations required to achieve our security objectives. Operations range from finding the enemy, to deconstructing his network and intentions, to putting weapons or other effects on target, to subsequently assessing the results. In Iraq, to eliminate Abu Musab al-Zarqawi, Predator unmanned aircraft executed over 600 hours of reconnaissance and surveillance operations to build sufficient intelligence for about 10 minutes of F-16 kinetic operations.

Increasingly, a single platform executes the entire kill chain. Aircraft normally associated with strike operations have excellent sensors on board, and in many cases their sensor data can be networked to others who can turn it into actionable intelligence. Armed unmanned aircraft systems (UAS) offer another approach to this hunter-killer combination. In fact, the al-Zarqawi incident involved an armed Predator, though ultimately an F-16 executed the strike. Air Force UAS pilots are very competent and comfortable with the responsibilities of finishing the kill chain when called upon to do so, yet a subculture in the Air Force does not feel comfortable with using so-called sensor platforms as shooters. The US Navy provides one example of a different cultural perspective.[15] Perhaps because of the traditional need for immediate prosecution of targets in antisubmarine warfare, the Navy arms manned ISR assets, putting AGM-65 Maverick and AGM-84 Harpoon missiles on the P-3 Orion maritime patrol aircraft.

ISR is the linchpin of an effects-based approach to operations (EBAO). One cannot accurately predict the effect of operations on an enemy system without good intelligence; nor can one assess the effects without detailed surveillance and reconnaissance. Intelligence requirements for an EBAO and effects-based assessment (EBA) are much more demanding than the old attrition-based "bean-counting" model. The increased intelligence detail necessary for EBAO/EBA makes focused reconnaissance and persistent surveillance operations increasingly crucial.

ISR Denotes Synchronization and Integration

There is nothing new about the nature of intelligence—Sun Tzu spoke extensively of its importance around 500 BC in *The Art of War*. Likewise, reconnaissance is as old as combat itself: "It is hard to imagine that the first two combatants in war, whoever they might have been, embarked upon conflict without attempting to gain some knowledge of the capabilities of their enemy."[16] On the industrial-age battlefield, scout reconnaissance teams reported what they saw "over the hill" to their commander. Airborne reconnaissance was effects based from its beginnings with the use of balloons by the French against Austria in 1794. The balloons not only collected valuable intelligence data but also reportedly had a demoralizing effect on the Austrian troops.

Conversely, only "surveillance" is a relatively modern term, truly gaining its distinction in World War I, when indirect artillery fire proved key to many battles. Accurate, timely reconnaissance over time—surveillance—became necessary for targeting beyond the commander's

line of sight. Effective surveillance emerged from the nexus of airpower and radio communications and was among World War I Airmen's original core missions. From this nexus we also see the genesis of the cultural distinction between intelligence ends (missions) and the surveillance and reconnaissance ways (tactics) by which it was collected.

Technology can exacerbate the conflation of ways with ends. The inherent link between intelligence on the one hand and surveillance and reconnaissance on the other continues to be analysis. Collection through surveillance and reconnaissance provides the input to the ISR enterprise—intelligence is the tangible output. Confusion about the nature of this link emerges when the intelligence need is simple or has been automated to such a degree that it is discernable without specialized analysis or interpretation. Airborne full-motion video (FMV), the prevalent modern example, provides the intelligence that every ground commander has desired since the dawn of warfare—the ability to see what the enemy is doing over the next hill. Simple FMV surveillance fills the intelligence requirement, but when we don't need dedicated intelligence analysis and production, it can easily be misinterpreted as a stand-alone surveillance capability. This is still the intelligence cycle, only executed in parallel rather than the sequential mode common to industrial-age warfare. In this misinterpretation, we lose any notion of how much all-source intelligence analysis we need to get that FMV-collection capability in the right place, the automated processing necessary to provide a formatted data stream, and the dissemination architecture required to provide that feed in such a way as to have significance to the untrained eye.

Balloon reconnaissance during the French Revolutionary Wars and airborne artillery spotting in World War I may have established the basis of the cultural distinction between intelligence *support* (staff) and reconnaissance and surveillance *operations* (fliers). FMV is a proximate example in the current conflict. The prevailing cultural distinction, however, is the result of efforts to distinguish airborne early warning from intelligence. It is the classic case

of the confusion of personnel and platforms with purpose. In this case, the personnel are Airmen with air-battle-manager Air Force specialty codes (AFSC) 13B (officer) and 1A4 (enlisted), and the platforms are the E-3 AWACS and E-8 Joint Surveillance Target Attack Radar System (JSTARS). The combination of multiple purposes is the point of contention. Airborne early warning (in the case of the AWACS) and ground early warning (JSTARS) are both surveillance missions. Both are subsets of ABM, which, in turn, is a subset of command and control (C2).

Like ISR, C2 is a foundational operational function inherent to effective operations. C2 is the end (purpose), ABM is the way (method/tactic), and radar surveillance is the means (sensor/system). In the case of ISR, intelligence is the end, surveillance and reconnaissance are ways, and radar is a means. Such a view clearly reveals that situational awareness is the common thread. Effective C2 is based on accurate, up-to-date intelligence of the adversary's air and ground situation, provided through surveillance. In other words, air battle managers are interpreting the surveillance data to make sense of it—interpreting its intelligence value—for the purpose of C2.

Ultimately, though we have many ways of drawing the distinction between surveillance and reconnaissance, in all cases we see that they are means of gathering data, from which, through analysis and synthesis, we derive intelligence. Such intelligence fuels decision making—whether for the ground commander, the air battle manager, the counterair mission commander, or the commander in chief.

ISR Is Domain Neutral

Just as ISR is indivisible by mission, neither can it be segregated by domain without diminishing its effects. To repeat General Moseley's pronouncement, ISR is "the foundation of Global Vigilance, Reach, and Power." ISR is the one major mission area in the Air Force that truly cuts across all domains and affects almost every other mission area. Air, space, cyber, and surface ISR capabilities are tailored

to provide the flexibility, responsiveness, versatility, and mobility required by the strenuous demands of fluid, global taskings.

We use the information collected through surveillance and reconnaissance and converted into intelligence by exploitation and analysis to formulate strategy, policy, and military plans; develop and conduct campaigns; guide the acquisition of future capabilities; and protect, prevent, and prevail against threats and aggression aimed at the United States and its interests. Air Force ISR operations are not inherently strategic, operational, or tactical in nature; rather, they gather information and provide knowledge to meet requirements at all levels of warfare. ISR operations cut across all domains and are conducted throughout the range of military operations from peace, to war, to conflict resolution.

Today, Air Force ISR is undergoing an actual *revolution* in effects-based application rather than simply *evolving* to meet increasing demands. The revolutionary view of effects-based application of ISR points instead to the role that Air Force intelligence plays as a global, data-bridging function among all domains as well as assets. Truly efficient ISR effects demand integration of all air, space, and cyber feeds into the Global Information Grid. Still, the demonstrated importance of ISR in modern warfare has made it a cross-domain battlespace. Everyone wants a piece of this hot growth area. Even those who accept the indivisibility of ISR as a mission have a tendency to divide ISR organizationally by domain. In practice, such advocates are interested in ownership of the parts of the ISR mission that operate in, to, or from their domain.

The space and cyber domains exemplify this phenomenon. When Air Force Space Command stood up as a major command (MAJCOM) in 1982, it took a certain amount of control of ISR within the space domain. The command's core missions include space surveillance and early warning. From a domain-neutral perspective, these missions are both surveillance. Space surveillance involves surveillance *of* space—satellites and debris—*from* the surface. Early warning is surveillance *of* the air and surface—mostly warnings of bal-

listic missile launches—*from* space. In both cases, we do the surveillance for the purpose of situational awareness—filling intelligence gaps. Conflating ways, means, and ends creates barriers and rivalries among domains, commands, career fields, and information channels, ultimately diminishing the effectiveness and credibility of ISR.

Today, some are applying similar logic to the stand-up of Air Force Cyber Command, but to an even greater extreme. These people have advocated subordinating all of the Air Force's ISR under this new command. Such a move would quickly flesh out an organization chart at minimal cost to existing MAJCOMs, as the intelligence community funds large portions of ISR capabilities. This line of thought, however, misses the fact that, although we conduct parts of the Air Force's ISR mission in the cyber domain, those parts are no more or less significant than those in the air, space, and surface domains.

No specific domain can or should lay claim to a monopoly on the Air Force's ISR mission. Although our service flies and fights in the commons of air, space, and cyberspace, it does not confine its ISR to a specific medium. ISR capabilities in one domain share a complementary role with those in another, and to optimize the benefit of information access, we must employ them in a completely synergistic manner. This was the rationale behind establishing the Air Force ISR Agency as an Air Force–wide enterprise and changing it from reporting to one MAJCOM to having it report instead to the Air Force deputy chief of staff (DCS) for ISR.

ISR effectiveness is determined by its utility to decision superiority; thus it serves as a balance among accuracy, completeness, timeliness, and accessibility. Stovepiping ISR by domain produces needless duplication and rivalry, creating the need for convoluted coordination and cross-checking between organizations to make up for the dysfunction that such artificial separation introduces into the intelligence cycle. Ultimately, decision makers care about the *so what* of intelligence. The *where* of collection—*from* surface, air, space, or cyber, or *of* surface, air, space, or cyber—is of little conse-

quence. ISR is an operational mission, interdependent with other operations of all the services and commands and across all domains.

ISR Is About Capabilities and Effects, Not Personnel, Platforms, and Culture

A key barrier to realizing the inherent indivisibility of ISR is the way the Department of Defense (DOD) collectively manages ISR as individual program elements within a defense-budget process that one can at best describe as Byzantine. *Where* is not the only misguided question that affects the recognition of optimum ISR operations in the Air Force. Too often, advocates of divided ISR focus on questions of *who* and *how*. *Who* improves the situational awareness of the decision makers? *How* does the information flow? *Who* owns or controls the systems or assets? *How* was the system or asset funded?

From the previous tenets, it follows that the Air Force should effectively manage ISR with a capabilities- and effects-based approach. General Moseley recognized this when he established the new Air Staff A2, elevating the position to a DCS responsible for ISR collectively as an Air Force–wide enterprise. The consolidation of ISR under a DCS is consistent with strategic guidance in the Quadrennial Defense Review of 2006, which directed that each "Department will work to re-orient its processes around joint capability portfolios."[17] The capabilities-based construct dictates that for all actions—from planning, to programming, to acquisition, to employment—ISR effects and capabilities must drive and shape the effort to satisfy the needs of joint decision makers. Effective ISR simply cannot be driven by numbers of platforms or pots of money.

Under the program-based construct, too often the narrow focus of program optimization results in missed opportunities to integrate, analyze, and interpret information of value to war fighters and decision makers. Most combat aircraft in the US military have some type of sensor on board, yet virtually all of that potential ISR data is figuratively left on the floor of the cockpit. In the current program-centric budgetary world of the DOD, narrowly focused optimization of individual platforms, sensors, and systems is the norm. Absent a clear definitive strategy, the big picture is lost to a collection of kluged-together widgets. In the current environment, why would the AC-130 program-element manager spend the program's funds on seamless integration of the aircraft's sensor data into the Global Information Grid if doing so doesn't put more rounds on target? Conversely, why would the intelligence community contribute funds to a program outside its control, knowing that the funds could be redirected?

By converting to a capabilities-based construct, we will seek to close the existing Air Force cultural rifts in ISR by aligning the service's ISR capabilities with Joint Capability Areas. As previously illustrated with FMV and space early warning, artificial distinctions can confuse *who* accomplishes the process with *what* effect the process achieves. An Airman with AFSC 14N (officer) or 1NX (enlisted) need not necessarily be involved in the process for the effect to be correctly considered intelligence.

Providing imminent threat warning to a pilot in combat illustrates this point. An intelligence Airman (officer or enlisted), either at the air operations center or even at a wing operations center, could process and analyze incoming information, recognize a threat to an ongoing mission, and relay that intelligence to the threatened pilot through various C2 nodes. Although this happens, it is cumbersome, time consuming, and unlikely to enjoy broad success. We routinely use a streamlined version of this process when RC-135 Rivet Joint mission-crew Airmen pass imminent threat warning. Receivers on board the jets collect various electronic signal data in the environment, onboard systems process the data into usable information, and crew members interpret which information constitutes a threat requiring action. The AFSC of the analyst and disseminator is immaterial—the effect is enhanced situational awareness for the combat pilot through the input of timely, accurate, and relevant intelligence.

We see a further simplified version of this process when aircraft are equipped with radars, radar warning receivers, and other systems designed to collect, process, and interpret many threats without outside intervention, depending on the aircrew to decide which inputs require action. Although a radar warning receiver may lack the fidelity and accuracy of more refined techniques of signals-intelligence analysis, the need for timeliness of intelligence in threat-reaction situations drives the acceptance of greater risk. Untold ISR goes into the development and programming of these systems to allow the aircrew to make the final interpretation of the provided intelligence and act accordingly. In all of these cases, however, the increased situational awareness of the pilot results from intelligence based on reconnaissance, surveillance, or both.

The Flight Plan

The lines between intelligence, surveillance, and reconnaissance are the product of historical and institutional biases. Today, our EBAO and joint UAS operations demand a transformed mind-set and new organizational construct. The Navy made this leap years ago. Submarines have always been hunter-killers—armed ISR platforms. Conversely, antisubmarine platforms are in a constant state of doing ISR. Submarines, the original stealth assets, are among the hardest things in the world to find. The Navy learned the hard way in two wars against submarines that if the kill chain is not nearly immediate, the probability of a submarine kill drops precipitously. There are parallels today in hunting for terrorists, which will carry into future air warfare against armed, hostile UAS and hostile stealth aircraft.[18]

Our service must embrace cross-domain ISR as a major Air Force mission that enables and optimizes the effects of every other mission. In the information age, the intelligence gleaned from surveillance and reconnaissance also has effects all its own. To fully recognize all the effects of ISR requires that we change parts of our organizational culture.

ISR is a mission set and must be prioritized on par with other Air Force missions. No longer can we treat ISR missions as *support* to operations. ISR *is* operations and is foundational to everything the Air Force does.

ISR is about synergy. Integration and synchronization make the effects of collective ISR far exceed their potential when they are separated. All of the data and information required for the production of intelligence are the result of reconnaissance and surveillance collection; conversely, the sole purpose of surveillance and reconnaissance is to collect data and information for the production of intelligence.

ISR deals with knowledge, regardless of where its effects are (to, from, in, or through) and regardless of who produces or receives it. We must view ISR in terms of capabilities and effects. It has to do with decision superiority—not platforms, sensors, and AFSCs. The US military must ensure that strategy guides and informs the programming of budgets—not the reverse. A coherent cross-domain ISR strategy must underpin budgetary decisions.

Moving forward on these tenets of indivisible ISR starts with doctrine. By definition, doctrine is the body of fundamental beliefs about guiding principles. Thus, the principle of indivisible ISR as discussed herein is in fact an Air Force doctrine for ISR and should be included in AFDD 1, *Air Force Basic Doctrine*, 17 November 2003, which currently does not define ISR collectively. As such, it is out of synch with joint doctrine and the more recent AFDD 2-9.

The nature of ISR has not changed, but its character has. The challenge before us is to transform *today* to dominate an operational environment that has yet to evolve, and to counter adversaries who have yet to materialize.

The transformation of Air Force ISR is in progress. The Air Force DCS for ISR is crafting a unified ISR strategy for the service—an instrument to connect ends, ways, and means to maximize the synergy of ISR capabilities in air, space, and cyber beyond the scope of our current program plan. It will look out more than three budget cycles in order to break the programmatic bonds that currently tie us to an old culture of systems, platforms, and pro-

grams. It is the difference between conceiving of "the son of JSTARS" (a marginally better airplane with evolutionary sensors) and "the future of surveillance" (a seamlessly integrated, network-centric collection capability).

At the employment level, we have provided to the Joint Functional Component Command for ISR the core for a global ISR concept of operations that reflects the optimal integration of ISR operations, manned and unmanned, across all domains—air, sea, land, space, and cyber. The intent is to provide a basis for combatant commanders to address ISR in a holistic and joint fashion. To institutionalize this kind of approach inside the Air Force and to develop and execute integrated, holistic ISR tactics, techniques, and procedures, the Air Force is forming an ISR Center of Excellence at Nellis AFB, Nevada.

Parceling out ISR capabilities breeds inefficiency; promotes multiple, overlapping concepts of operations and tactics, techniques, and procedures; and desynchronizes processes. Capability hubs—centers of excellence—offer a more efficient means to present integrated ISR capabilities consistently and effectively, while maximizing capacity.

For example, the Air Force chief of staff recently directed consolidation of the Air Force Distributed Common Ground System—the first global network-centric weapon system—into a single wing. Where previously five key system nodes belonged to three different MAJCOMs, now the 480th Intelligence Wing will be the focal point for all Air Force airborne ISR processing, exploitation, and dissemination.

Furthering this tenet, my plans for Air Force ISR include establishing an analysis center of excellence at the National Air and Space Intelligence Center, which will exhibit the domain-neutral tenet of indivisible ISR by integrating air, space, and cyber analysis in a single reach-back node. Likewise, targeting is a recognized Air Force intelligence analytic competency that currently consists of pockets of expertise spread across the MAJCOMs. I also intend to recommend to the chief of staff that we establish an Air Force Targeting Center of Excellence to reinforce the Air Force as the DOD's targeting focus, provide a single point of contact, and enhance the discipline by consolidating expertise.

The magnitude and speed of change are the twenty-first century's defining features. The information-age world is increasingly interconnected, and knowledge of crises around the world reaches global audiences as they happen, lowering flashpoints and decreasing margins for error. As with every other aspect of the information age, victory will go to those who create and exploit knowledge faster than their opponents—and increasingly in ambiguous and uncertain situations. Meeting this challenge requires a shift from a Cold War mind-set that treats ISR as a supporting function to a new understanding that in the twenty-first century, ISR will perhaps become the key mission set in achieving our national security objectives. Accordingly, we should more appropriately view ISR as the key integrating element for effective national security policy and operational design, planning, and execution. This will require adjusting concepts and processes to allocate, plan, and employ ISR as a cohesive entity. Doing so may result in a synergy of ISR much greater than we have ever experienced in the past, which will make ISR—like airpower writ large—one of America's asymmetric advantages. ❏

Notes

1. The indivisibility of airpower was the tacit argument behind the secretary of the Air Force's white paper *The Air Force and U.S. National Security: Global Reach—Global Power* (Washington, DC: Department of the Air Force, June 1990).

2. Abraham Lincoln, "House Divided Speech" (Springfield, IL, 16 June 1858), *Abraham Lincoln Online*, http://showcase.netins.net/web/creative/lincoln/speeches/house.htm.

3. Ibid.

4. Rich Haver, "Why ISR? The Significance of an AF DCS for ISR" (prepared comments for the 55th Wing ISR Symposium, Omaha Hilton, 24 May 2007).

5. Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (as amended through 17 October 2007), 271, http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf.

6. Ibid., 5.

7. Ibid., 163.

8. Ibid., 392.

9. Ibid., 268.

10. Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, 17 November 2003, 54, https://www.hqafdc.maxwell.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd1.pdf.

11. JP 1-02, *Department of Defense Dictionary*, 525.

12. David Jordan, "Surveillance and Target Acquisition," in *The Oxford Companion to Military History*, ed. Richard Holmes (Oxford, UK: Oxford University Press, 2003), 887–88.

13. JP 1-02, *Department of Defense Dictionary*, 453.

14. See ibid., 271. Conversely, the acronym RSTA (reconnaissance, surveillance, and target acquisition) offers an example of how nonjoint terminology occludes productive dialogue; target acquisition is simply a specific intelligence product or outcome, not a mission in and of itself.

15. Fifty-seven percent of targets engaged by the US battleships *Missouri* and *Wisconsin* were located from the air by UASes. Jordan, "Surveillance and Target Acquisition," 887–88.

16. David Jordan, "Reconnaissance/Reconnoiter," in *Oxford Companion to Military History*, 760–61.

17. Department of Defense, *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, 6 February 2006), 68, http://www.defenselink.mil/pubs/pdfs/QDR20060203.pdf.

18. Haver, "Why ISR?"

Fifth Air Force

Ready for the Future

Maj Gen Larry D. James, USAF

O N 11 AUGUST 2007, a pair of Russian Tu-95 bombers flew from eastern Russia, skirted the coast of Japan, turned south, and headed for Guam, where US forces were conducting Exercise Valiant Shield, which involved over 280 aircraft, 30 ships, and more than 20,000 service members. Although the Russian bombers never approached closer than 380 miles from Guam, this mission offered one more indication of the revitalization of the Russian military under Pres. Vladimir Putin. On 11 January 2007, China launched its first antisatellite weapon against one of its aging weather satellites, successfully destroying the spacecraft and demonstrating another building block in China's capability to deploy asymmetric force. On 9 October 2006, North Korea detonated its first nuclear weapon, leading Japan's prime minister to declare that the test was "unpardonable" and that the region was "entering a new, dangerous nuclear age."[1]

At the geographic and political nexus of all this activity stands Japan and its coalition partnership with the United States. Since 2002 our leaders have moved the relationship forward at a record pace. The US secretaries of state and defense and the Japanese ministers of foreign affairs and defense have constructed the Defense Policy Review Initiative, a joint plan to transform the alliance and infuse it with greater capabilities. As the air component in Japan, Fifth Air Force has been instrumental in each of these events and is now engaged in multiple initiatives that will strengthen our alliance, serve as a counterbalance to potential threats in the region, and posture us for a successful future.

The Neighborhood

Jim Leach, former chairman of the House Subcommittee on Asia and the Pacific, observed that "it is in Asia where the United States will face its largest geopolitical challenges in the years ahead."[2] We have strong strategic interests in this region, home to 60 percent of the world's population, 35 percent of US trade, and an average expenditure of 2.4 percent of gross domestic product (GDP) on the military. Those interests will only become more important over time. The very real and present military capabilities of Communist countries in the region—North Korea and China in particular—and the rapid reinvigoration of Russian military capabilities drive home this point.

Recent Six Party efforts with North Korea have led to positive results toward the denuclearization of the peninsula. However, North

Korea still maintains one of the largest standing armies in the world with almost one million personnel under arms. Abysmal economic conditions, outdated military equipment, and the lack of a modernization program leave that country in a weakened military position. However, these facts do not prevent the Korean People's Army from posing a persistent, credible threat. Kim Jong Il's "military first" policy puts North Korea's few economic resources into maintaining a rapidly deployable force that can inflict tremendous damage in a short time. With numerous, long-range artillery pieces capable of targeting South Korean economic centers, one of the world's most highly trained special operations forces, and multiple ballistic missile variants, North Korea still represents a threat to neighboring democratic nations. The North's ballistic missile and nuclear tests in 2006 demonstrated this enduring danger.

North Korea's launch of six short-range ballistic missiles and a No Dong missile in July 2006 reflected its maturing ballistic missile capabilities. Despite the fact that the No Dong launch was unsuccessful and that these launches posed little military threat directly to the United States, they displayed Kim Jong Il's willingness to break his declared moratorium of 1999 on long-range missile tests. The future of North Korea's ballistic missile technology resides within the development of its Taepo Dong-2, No Dong, and Musudan programs. The Taepo Dong-2 receives an abundance of attention, but the No Dong and Musudan missiles are easily capable of reaching Japan minutes after launch. The unsuccessful launch of the No Dong indicates that the program is still a work in progress, but the Musudan's proven, Soviet-era technology represents advancement within the North's ballistic missile programs. These developments, along with the nuclear test in October 2006, exhibited Kim Jong Il's tenaciousness in pursuing his own agenda despite pressure from the international community.

North Korea's ballistic missile programs and forward-deployed military presence constitute persistent threats to regional stability. However, China's unclear goals concerning rapid military modernization represent another difficulty for US forces in the region. China's leaders have stated their intentions and have allocated resources to pursue broad-based military transformation to enable joint operations that encompass forcewide professionalization; improved training; more robust, realistic joint exercises; and accelerated acquisition of modern weapons. For the moment, China's military is focused on assuring the capability to prevent Taiwan's independence and, if Beijing were to adopt such an approach, to compel the island to negotiate a settlement on Beijing's terms. At the same time, China is laying the foundation for a force able to accomplish broader regional and global objectives. Analysts assess that it will take China until the end of this decade or later to produce a modern force capable of defeating a moderately sized adversary. In building such a capability, China's leaders stress asymmetric strategies to leverage their country's advantages while exploiting the perceived vulnerabilities of potential opponents. Strategists could view the antisatellite test of January 2007 in this context.

China's central doctrine emphasizes fighting a local war under modern, high-technology conditions. This type of war is limited in political objectives and geographic scope; highly lethal and destructive; short in duration; information and resource intensive; highly mobile; and jointly executed. Moreover, it possesses total battlespace awareness. To manage a war effectively under these conditions, China's defense now stresses projecting forces, gaining the initiative for a decisive first battle, and conducting joint-service campaigns.

Until recently, China's rise as an international player has overshadowed the gradual resurgence of Russia on the international stage. Recent statements from President Putin and principal military leaders concerning US ambitions for ballistic missile defense and the resumption of Cold War bomber patrols give cause to pay more attention to Russia than we have in the recent past. Russia's growing exports from the world's largest natural gas reserves and its place as the world's second-largest oil producer have fueled its recent military resur-

gence. In 2006 Russia's real GDP grew by 6.7 percent, marking the country's seventh consecutive year of economic expansion. Although its dependence on energy exports has created a vulnerability to fluctuations in the price of energy, energy exports in 2005 represented 20 percent of the country's GDP and 60 percent of its export revenues.

As mentioned above, prior to President Putin's announcement on 17 August 2007 of Russian bombers returning to Cold War levels, two Tu-95s flew toward Guam, flexing an arm of Russia's nuclear triad. Subsequent to Putin's remarks, activity along old Cold War patrolling routes has increased to levels not observed in 15 years. Multiple press reports concerning scrambles by the United Kingdom and Norway against Russian flights suggest that Russia is directing its attention not only to the United States but to the West in general. The Russians have records of filing flight plans and posting notices to airmen, but the resumption of patrols is a clear sign that they want to be taken seriously and have the economic, military, and political means to reinforce their actions.

Although North Korea, China, and Russia pose military challenges that require constant vigilance, we cannot forget the rest of the "neighborhood." The threat of violent extremism within the Pacific is focused in Southeast Asia and centered on the threat from al-Qaeda-influenced groups such as the Abu Sayyaf Group and Jemaah Islamiyah. Threats within Japan, though extremely rare, do exist in such forms as Aum Shinrikyo, now known as Aleph, responsible for the sarin gas attack in 1995. These and many more groups require relentless observation for the next asymmetric threat to US interests.

Not all such threats come in the form of terrorist organizations. For example, the Strait of Malacca, with its narrow, 500-mile-long passageway, creates a perfect location for piracy. Even though the strait is of immense strategic and economic importance, handling up to one-quarter of the world's sea trade and one-quarter of all oil trade, piracy has presented a continuous threat to transiting ships. In 2004 the navies of Malaysia, Indonesia, and Singapore began increasing their patrols in an effort to help reduce piracy, but the fact remains that the strait is an extremely important choke point for the entire Western Pacific, requiring vigilance by our forward-deployed forces in the region.

Forward Presence

Given the strategic importance and challenges of the Asia region, it is absolutely essential to forward-deploy forces there. Representative Leach also noted that "maintaining a robust overseas military presence has historically been a key element of the United States national security policy in the Asia-Pacific." This forward presence promotes regional stability and "has been maintained by successive United States Administrations, all of which have emphasized the linkage between our network of alliances and friendships to a regional environment in Asia conducive to confidence in economic growth."[3] Fifth Air Force and our alliance with the Japanese Air Self Defense Force (JASDF) embody that military forward presence in Asia. Fifth Air Force has the closest US Air Force (USAF) base to Russia (Misawa Air Base [AB]) and one of the closest USAF bases to China (Kadena AB). Our coalition operations with the JASDF send a clear message every day that US forward presence is robust, ready, and prepared to meet current and future challenges in the region. This strong partnership stems from over 50 years of bilateral operations and long-term relationships. Enduring presence in Japan has been key to the development of this association.

The key to Fifth Air Force's presence is the frontline air bases spanning Japan from north to south. In the north, Misawa AB is home to the 35th Fighter Wing, with two squadrons equipped with the most modern Block 50 F-16 variant and dedicated to the suppression of enemy air defenses. Misawa is the only bilateral, joint-service base in the Western Pacific, sharing space with the JASDF's 3d Air Wing and Northern Air Defense Command, as well as the US Navy's Information Operations Command.

In the center of Japan, just outside Tokyo, lies Yokota AB, home of the 374th Airlift

Wing and the 36th Airlift Squadron—the only forward-based tactical airlift squadron in the Pacific. The wing maintains C-130 mission-ready aircrews to conduct tactical and theater airlift, special operations, aeromedical evacuation, search and rescue, repatriation, and humanitarian-relief missions across the Pacific. In addition, the 374th has C-12s and UH-1s for operational-support airlift and serves as the key airlift hub for the Western Pacific, supporting multiple downrange locations in both peacetime operations and contingencies.

Wrapping up Fifth Air Force's bases is Kadena AB, in Okinawa, part of the Ryukyu Islands, strategically located for all of the potential major contingency scenarios in the Pacific theater. Kadena hosts the 18th Wing, the largest combat wing in the USAF. With F-15 fighters, KC-135 refuelers, E-3 Airborne Warning and Control System aircraft, and HH-60G Pave Hawk rescue helicopters, the 18th provides unmatched combat presence and capability in the Western Pacific. This strong USAF presence in Japan gives the United States critical access throughout the region, sends a clear message of our strategic interests there, and provides operating locations that we can quickly reinforce should the need arise.

Bilateral Operations and Training

Working together continuously with our JASDF counterparts is critical to the development of integrated operational capabilities. Fifth Air Force; Detachment 1, Thirteenth Air Force; and the JASDF have developed a robust exercise schedule to improve our capabilities and identify areas for improvement. Several examples highlight this trend. In July 2007, the JASDF deployed a squadron of F-2s from Misawa AB to Andersen AB, Guam, for Exercise Cope North 07-2—the first deployment of Japanese F-2 fighters outside Japan and the first time the JASDF has dropped live ordnance with this aircraft. Japanese F-2s, E-2C airborne early warning aircraft, and USAF F-16CJ fighters flew 303 sorties exercising dissimilar air combat training, surface-attack train-

ing, and large-force employment. This live-ordnance training for the JASDF is critical for its future Joint Direct Attack Munition program. The numerous activities and support requirements necessary to execute Cope North provided many bilateral-engagement opportunities. A JASDF maintenance squadron provided needed equipment and personnel to remove and repair an F-16CJ ejection seat while deployed to Guam. The 36th Wing's maintenance group on Andersen AFB assisted the JASDF in repairing an auxiliary power unit. JASDF and USAF flying squadrons alternated mission commanders during the large-force employment and conducted bilateral mission-coordination briefings/debriefings for each mission.

Additional bilateral-training exercises include Keen Sword and Yama Sakura, the former a live-fly air defense exercise sponsored by the chairman of the Joint Chiefs of Staff, which spanned 1,500 miles of airspace from Okinawa to Hokkaido. Keen Sword included fighter and support units/aircraft from the JASDF, USAF, US Navy, and US Marine Corps. Additionally, under this exercise's umbrella, several "supporting exercises" took place, including noncombatant-evacuation operations, search and rescue, and ballistic missile defense. Yama Sakura, a Japan Ground Self Defense Force and US Army exercise, focused on the defense of Japan. Both Keen Sword and Yama Sakura were vital tools for enhancing bilateral cooperation/interoperability and proved critical to defending Japan and maintaining security in the Asia-Pacific region.

Another tremendous success, the Aviation Training Relocation (ATR) Program, was originally mandated under the Security Consultative Committee with the intent to utilize Japanese air bases for US training and a particular focus on reducing training impacts on Okinawa across all the services. Aircraft from Okinawa bases would deploy to other JASDF bases throughout Japan, such as Komatsu, Hyakuri, and Tsuiki and conduct training there. Fifth Air Force units executed multiple ATR events in 2007 and plan to expand the program in 2008 and beyond. The program has provided numerous benefits for both US and JASDF

forces. On the US side, it affords the opportunity to deploy in country, train with different weapon systems and capabilities, and see JASDF bases that we have not recently visited. ATR site surveys have allowed for more accurate assessments of capabilities as well as potential shortfalls of JASDF bases. The fact that planners now have more realistic planning data improves the plan's quality. In addition, these surveys have yielded increased staff interoperability and coordination on maintenance and logistic support to USAF and JASDF aircraft. Dormant and rarely exercised international agreements and acquisition cross-servicing agreements are being updated to support this ATR initiative. For the JASDF, the program offers the chance for a base assessment by US forces and increases the number of bilateral-training venues; it also continues the operational-integration efforts critical to both forces.

Across the board, these training opportunities have produced clear improvements in our operational capabilities. The ability to learn from each other, synchronize our operations, and build key relationships will continue to pay dividends and lay the foundation for success well into the future.

Command, Control, and Information Sharing

In this modern age of real-time communication, networked operations, and massive data sharing, it is absolutely essential that strong command, control, and communications exist between the USAF and JASDF. We are moving forward in these areas on multiple fronts. The Japanese Air Defense Ground Environment represents a key improvement. This new system will provide not only the same air-track data as currently received but also the capability for Air Defense Command to transmit data regarding ballistic missile defense.

Additionally, we are putting in place two communications capabilities for bilateral engagement. The first—a dual-path, digital voice system for flight operations in the northern Sea of Japan—is scheduled in three phases throughout 2008. The second system will provide critical communications for "first responders" in the event of a natural disaster or contingency by connecting all service components and Japanese first responders with dedicated, shared frequencies for land-based mobile radios. This project is in its initial stages of coordination and engineering.

The heart of our bilateral air and missile defense operations—the Bilateral Air Operations Coordination System—features operational-level coordination between the USAF and JASDF in carrying out the roles and missions of the joint force air component commander, area air defense commander, and airspace control authority. The system deconflicts and integrates processes and products associated with the air and space operations center (AOC) weapon system for safe and effective operations. The JASDF and Thirteenth Air Force staffs are colocated at Yokota in a bilateral air component coordination element (BACCE) to execute the close and detailed bilateral coordination necessary when operating under unilateral and parallel lines of command and control. In 2010 the JASDF Air Defense Command will construct a new headquarters building at Yokota that will include a dedicated bilateral contingency facility for the BACCE, allowing constant, side-by-side operations and greatly improving coordination and training. Additionally, the JASDF is considering the acquisition of a theater battle-management system that will significantly enhance bilateral planning and coordination.

Overall, the integration of USAF/JASDF command, control, and information sharing has made noticeable progress in the last few years. The hardware, links, and processes now in place allow near-real-time situational awareness, reachback to Thirteenth Air Force's AOC in Hawaii, and strong coordination capabilities among the USAF, JASDF, and US Forces Japan. The planned improvements will continue that trend, ensuring that the right capabilities are in place to meet future challenges.

Ready for the Future

Throughout the decades, Fifth Air Force—which celebrated its 66th birthday on 20 September 2007—has led the charge in the Pacific, from World War II to Korea to Vietnam to the Cold War and, finally, to today's strategic operations. The men and women of Fifth Air Force are engaged every day with our Japanese allies, improving capabilities, integrating our forces, and maintaining a clear and visible presence in the region. As we look to the future, Fifth Air Force will continue to set the standard for bilateral engagement with one of America's closest allies. In this vital strategic region, it will remain an enduring presence for decades to come, ensuring that the interests of the United States and Japan are addressed and well protected. ❑

Notes

1. "North Korea Claims Nuclear Test," *BBC News*, 9 October 2006, http://news.bbc.co.uk/2/hi/asia-pacific/6032525.stm.

2. House, *America and Asia in a Changing World: Hearing before the Subcommittee on Asia and the Pacific of the Committee on International Relations*, 109th Cong., 2d sess., 21 September 2006, 3, http://www.foreignaffairs.house.gov/archives/109/29971.pdf.

3. House, *U.S. Security Policy in Asia and the Pacific: Restructuring America's Forward Deployment: Hearing before the Subcommittee on Asia and the Pacific of the Committee on International Relations*, 108th Cong., 1st sess., 26 June 2003, http://commdocs.house.gov/committees/intlrel/hfa88000.000/hfa88000_0.HTM.

Remembering Almerisio Lopes

THE *AIR AND Space Power Journal* family mourns the loss of Mr. Almerisio "Al" Lopes, longtime editor of *Air and Space Power Journal-Portuguese (ASPJ-P)*, who passed away on 14 January 2008. A native of Brazil, Al later became a US citizen and in 1974 began working as a translator for the Brazilian edition of *Military Review*, the professional journal of the US Army. In 1978 he took charge as editor of *Military Review*'s Brazilian edition, a position he held until 1989 when he became editor of *ASPJ-P*. He was an exceedingly meticulous editor who spared no effort to ensure that his journal brought the best cutting-edge scholarship to his international audience.

During over a third of a century of distinguished service, Mr. Lopes earned many honors, including the Superior Civilian Service Award from the US Army; the Medalha do Mérito Aeronáutico from the Portuguese Air Force; the Ordem do Mérito Aeronáutico, grau cavaleiro, and the Medalha do Mérito Santos-Dumont, both awarded by the Brazilian Air Force; and the Ordem do Mérito Militar, grau cavaleiro, Medalha do Pacificador, and Colaborador Emérito do Exército, from the Brazilian Army.

These official awards were only the tip of the iceberg. Based on his generosity and spirit of service, Mr. Lopes built an extraordinary worldwide network of friends for the US military. For example, he sponsored numerous international officers while they attended Air War College, Air Command and Staff College, and other Air University schools. Many of these officers were from Portuguese-speaking countries such as Brazil, Portugal, and Angola, but Al also spoke fluent Spanish and sponsored many officers from Argentina and elsewhere. Even if not formally sponsoring them, he was always eager to help international officers with anything from automotive repairs to enrolling their children in Alabama schools. The lengths to which he would go to help others needed to be seen to be believed. A number of these officers rose to high ranks and fondly remembered Almerisio's kindness. Al also made friends by helping Air University host many international delegations of visitors. He not only escorted dignitaries but also conducted impressive briefings for them in Portuguese, showcasing Air University's reputation as a

world center of air, space, and cyber education. To understand the professional-development needs of his overseas readers and to solicit articles for *ASPJ-P,* Al traveled extensively to South America, Europe, and Africa. He seemed to know almost everyone in the Brazilian and Portuguese Air Forces and visited the Angolan Air Force for the first time in 2007.

I saw Al as a diplomat who surmounted language barriers and geography to make friends for the United States on a global scale. I knew him for about 12 years and watched him in action on four continents. He spoke several languages, but I think his real gift was a genuine charisma that helped him befriend both the mighty and the humble. Always graceful and eloquent, he was equally at ease with the most senior officers and the most ordinary folks. He patiently forged international understanding, something in short supply. After he died, condolences written in various languages poured in from all over the world. We will continue to publish the *Air and Space Power Journal-Portuguese,* which he ran for many years, but will always miss our dear friend Almerisio Lopes. ❑

Ricochets and Replies

We encourage you to e-mail your comments to us at aspj@maxwell.af.mil or cadreaspj@aol.com. We reserve the right to edit your remarks.

REMEMBERING ALMERISIO LOPES

On behalf of the Portuguese Air Force, former chief of staff Gen Manuel Taveira Martins and I would like to express our deepest sadness for the unexpected death of Almerisio Lopes, editor of the *Air and Space Power Journal,* Portuguese edition, and extend our sincere condolences to his family for such a terrible loss.

Gen Luís Evangelista Esteves de Araújo
Chief of Staff, Portuguese Air Force
Lisbon, Portugal

INTRODUCING THE CHINESE *ASPJ*

I read with interest the first and second issues of *Air and Space Power Journal,* Chinese edition, and concluded that this is a journal of value. First, I very much agree with the purpose and direction of the journal. It aims to open a window of exchange between Chinese and US air forces and military-research institutions, with the forward-thinking intention of promoting bilateral transparency between the two countries. Next, from the general framework and focus topics of the journal, I see the editor's painstaking efforts in offering readers great articles that reflect the various aspects of US airpower. Finally, I want to stress that the birth of this Chinese edition happened at the right point in time for the following reasons: Sino-US high-level militaries have increased the frequencies of bilateral visits; defense ministries have agreed to set up a Sino-US military hotline; militaries of both countries have found more common ground in United Nations and world affairs; and China's recent successful launch of the Chang'e-1 circumlunar satellite has created a new wave of interest among Chinese readers in "space" along with "air." It is my belief that more and more mainland Chinese readers—potentially the biggest reading community of your journal—will pay serious attention to and discuss the viewpoints presented in your articles, which eventually will help lead to the goal of "exchange towards transparency."

Yan Weiping
Retired Military Academy Instructor
Nanjing, China

My reading of *Air and Space Power Journal*, Chinese edition, tells me that this is a high-quality military academic journal, based on the latest military technological information and containing objective strategic analysis as well as fluent language. It is a journal that audiences are excited to read and happy to share. Please accept my heartfelt congratulations on the success of this journal and my best wishes for its continued growth. May it continue offering rich information to Chinese readers.

<div align="right">

Liu Canglang
Fairfax, Virginia

</div>

LORENZ ON LEADERSHIP: PART 2

I enjoyed Lt Gen Stephen R. Lorenz's article "Lorenz on Leadership: Part 2" (Spring 2008). I am one of many civilians going through a difficult time getting used to the new National Security Personnel System (NSPS) performance-rating system. My first NSPS rating was only average. This was a shock because my service wasn't just average. I worked hundreds of hours of unpaid overtime managing an airfield. Prior to the NSPS, I had never minded putting in the extra hours, and I usually felt that my hard work was rewarded and reflected in my rating. When I received the "valued employee" rating, I didn't feel valued. To be honest, I felt that the rating system had gone cold, and I felt low. Then I read General Lorenz's article, and it reminded me of several ideas related to service that helped me get through the loss, grief, and change. First, I'm not entitled to an above-average rating, even if I feel like I deserve one. Also, my career is a marathon, and I can use the experience to motivate myself in positive ways. Finally, my service is not just about me, so I need to "get over it" and press on positively in order to lead my people effectively and to do my best for my country. Thanks for the very mature point of view. It's some of the best advice I've heard lately.

<div align="right">

Gerald Sikorski
Beale AFB, California

</div>

EXPOSING THE INFORMATION DOMAIN MYTH

I plunged into Maj Geoffrey F. Weiss's article "Exposing the Information Domain Myth: A New Concept for Air Force and Information Operations Doctrine" (Spring 2008) with a certain skepticism, but soon it became apparent that the author "gets it." I say this as a veteran of the late-1990s debate in the intelligence community over such concepts as "information dominance" and "information superiority," which had mercifully short lives. The primary objective of *information warfare* (a term we can't use due to political reasons) as well as other military operations is the human mind. After all, the mind comes up with its picture of reality and evaluates perceived risks and rewards for any action or nonaction. The mind is the true battleground. It is also the most difficult battleground to understand and predict. Therefore, researchers are now exploring (some more effectively than others) concepts such as behavioral influence analysis in an effort to understand, predict, and utilize what can or cannot influence someone to take actions advantageous to us. And that is the operative essence of information operations. I believe that Air Force thinking about information operations is finally getting to where it should have been in the early 1990s.

<div align="right">

Lt Col Keith Anthony, USAFR
Xenia, Ohio

</div>

Even though the author of "Exposing the Information Domain Myth: A New Concept for Air Force and Information Operations Doctrine" wants to shift intelligence, surveillance, and reconnaissance (ISR) operations doctrine under information operations (IO) because proper ISR operations are "an essential aspect of IO" (p. 57), I feel that this is an incorrect assumption.

Major Weiss's argument does not address how or why ISR falls under IO. Using his proposed definition of IO as "the integrated employment of Air Force capabilities to influence, disrupt, corrupt, or usurp adversary information, information systems, perceptions, and/or decision making while protecting our

own" (p. 57) does not equate to or cover the definition of ISR from Air Force Doctrine Document 2-9, *Intelligence, Surveillance, and Reconnaissance Operations*, dated 17 July 2007. That manual defines ISR as "an activity that synchronizes and integrates the planning and operation of sensors, assets, processing, exploitation, and dissemination systems in direct support of current and future operations" (p. 1).

The tasking, processing, exploitation, and dissemination (TPED) phase of ISR operations is critical not only to IO but also to every phase of Air Force influence operations from counterair to targeting. Good TPED has nothing to do with the influence, disruption, or corruption of an enemy system, but with monitoring and reporting in a manner that allows decision makers to launch operations against the enemy decision-making process. Even as the author concludes that all aspects of Air Force operations—flying or otherwise—belong to IO, ISR still falls outside this field because it is a force enabler.

Although I focus on ISR in my response, ultimately I think that the author has made the opposite jump, moving from what he saw as too narrow a definition of IO to one that is too broad. I think that all doctrine is best served by a narrower interpretation. Narrow doctrine allows all users to focus on their own operational challenges within their areas before moving on to integrate those operations. In our current operational scheme, doctrinal advocates represent their operational requirements at the air and space operations center through a liaison officer to provide a unified whole. Expanding everything from a single IO voice in the crowd to only an IO voice to strategic leadership does nothing to improve that unified whole.

Maj Mark Peters, USAF
Seymour Johnson AFB, North Carolina

A LOOK DOWN THE SLIPPERY SLOPE

After reading Maj Bryan D. Watson's article "A Look Down the Slippery Slope: Domestic Operations, Outsourcing, and the Erosion of Military Culture" (Spring 2008), I'd say there is a very real danger that two new elements of

military readiness, namely, the increasing use of contractor services and the use of bonuses as an incentive for retention, will gradually transform the volunteer force into a mercenary force. There won't be a clear line of demarcation; it will occur over time, but it could have fatal results.

Col Walter J. Boyne, USAF, Retired
Ashburn, Virginia

EFFECTS-BASED INFORMATION BATTLE IN THE MUSLIM WORLD

In "Effects-Based Information Battle in the Muslim World" (Spring 2008), Remy Mauduit's call for a counteroffensive to terrorist rhetoric is right on. His list of objectives and themes for a proposed Department of Defense Islamic Information Center is outstanding. His observations that Islam is in transition, that terror and Islam are not the same, and that generalizations about various movements have caused confusion are critical. However, Mr. Mauduit's call to "refrain from framing terrorism in an Islamic religious context" (p. 110) requires overlooking the reality that these terrorists claim to be Muslims and diminishes incentives for moderates to confront those who are hijacking their religion.

In the long run, only Muslims themselves can effectively police terrorism perpetrated by other Muslims, and only Muslims themselves can effectively separate terrorism from Islam in the consciousness of other Muslims.

We know that linking violence to Islam embarrasses Muslims. Recall, for example, the response to remarks Pope Benedict XVI made in 2006 about violence in Muslim history. If, contrary to Mr. Mauduit's recommendation, political, business, cultural, and religious leaders and their spokespeople persist in calling the terrorists what they call themselves, which is Muslims, and insist on questioning, based on the behavior of these terrorists, the nature of Islam, then Muslims will have increased incentive to clean up their own house by purging the terrorists from among them to restore respectability and dignity to Islam.

In its struggle for what Mr. Mauduit calls "values, identity, and place in the world" (p. 109),

contemporary Islam is like a household with an alcoholic father. As long as outsiders cooperate with the family members' denial, they enable the family to avoid treatment and remain dysfunctional. Combating terrorism is like a 12-step recovery process. Getting the family of Islam to admit to and face its internal problem is the first step to restoring peace to the family.

Terrorism and Islam may be different and irreconcilable, but Muslim-supported and perpetrated terrorism done in the name of Islam is a Muslim problem that Muslims can solve if we hold them accountable to do so.

Chaplain (Maj) Bruce Sidebotham, USAR
Camp Robinson, Arkansas

TO BOMB OR NOT TO BOMB?

I welcome Maj Jason M. Brown's article "To Bomb or Not to Bomb? Counterinsurgency, Airpower, and Dynamic Targeting" (Winter 2007), in which the author recommends additional doctrine and personnel to address kinetic airpower operations in a counterinsurgency effort. Major Brown correctly suggests that the Air Land Sea Application (ALSA) Center develop multiservice tactics, techniques, and procedures (MTTP) for time-sensitive targeting (TST) during a counterinsurgency. In 2004 ALSA delivered a well-written MTTP for TST that's already referenced throughout the joint force by both operations and intelligence personnel. Since ALSA is currently revising this MTTP, adding an appendix to address counterinsurgency operations would be both timely and relevant.

In addition Major Brown advocates that Air Force Weapons School graduates; targeteers; and intelligence, surveillance, and reconnaissance experts integrate within Army division headquarters staffs to supplement the air support operations group (ASOG). In my opinion, this proposal would maximize the ASOG's ability to integrate air-to-ground operations and enable this joint Army–Air Force team to achieve the joint force commander's TST objectives.

Finally, I thank Major Brown for writing an article relevant to everyone from the youngest wingman employing ordnance on his or her first combat mission all the way up to the joint force air component commander approving an air strike against insurgent leaders. This thought-provoking piece should be required reading for air and space operations center personnel in Al Udeid Air Base, Qatar. All Airmen entering the center would benefit from reflecting on Major Brown's words.

Lt Col James Kockler, USAF
Norfolk Naval Air Station, Virginia

DAWN OF THE COGNETIC AGE

Is Lt Col Bruce K. Johnson's article "Dawn of the Cognetic Age: Fighting Ideological War by Putting Thought in Motion with Impact" (Winter 2007) really a new way of thinking? One of the things that strikes me is that we have spent an awful lot of time and effort since 11 September 2001 reorganizing and developing new task forces for specific missions. We've also spent a lot of intellectual capital on trying to define the type(s) of war we are fighting and going to fight (fourth-generation, asymmetric, irregular, global war on terrorism, etc). I really do like Colin Gray's maxim no. 14 in his new book *Fighting Talk: Forty Maxims on War, Peace, and Strategy* (Praeger, 2007): "If Thucydides, Sun Tzu, and Clausewitz Did Not Say It, It Is Probably Not Worth Saying" (p. 58). I think as we wrestle with trying to change definitions, strategy, concepts, doctrine, and organizations, we should keep in mind Gray's wise words.

COL David S. Maxwell, USA
Fort Bragg, North Carolina

THE INADVISABILITY OF POSTHUMOUSLY PROMOTING BILLY MITCHELL

I would like to make a comment about Col Phillip Meilinger's article "The Inadvisability of Posthumously Promoting Billy Mitchell" (Summer 2007). Allow me to disagree partially with the author. Colonel Meilinger says the following about General Mitchell's literary work: "In the case of Billy Mitchell, he contributed relatively little after leaving the Air Corps

in 1926. He lived for another decade, but in truth, he became largely a forgotten figure, seldom called upon by his country or his service. His one book, *Skyways: A Book on Modern Aeronautics*, merely rehashed old ideas previously published" (p. 35).

Billy Mitchell wrote much more than just his famous book *Winged Defense: The Development and Possibilities of Modern Air Power, Economic and Military* (1925) and the *Skyways* book to which Colonel Meilinger refers in the quotation above. As a matter of fact, he published some books (plus numerous articles) about aviation after leaving the US Army in 1926.

Finally, thank you very much for the opportunity to express my admiration for General Mitchell in this highly regarded forum.

Lt Col Mauro Barbosa Siqueira, Brazilian Air Force
Rio de Janeiro, Brazil

Editor's Note: Lieutenant Colonel Mauro read the Portuguese version of this article, available at http://www.airpower.maxwell.af.mil/apjinter national/apj-p/2007/4tri07/meilinger.html.

THE INADVISABILITY OF POSTHUMOUSLY PROMOTING BILLY MITCHELL: THE AUTHOR RESPONDS

Thanks so much for your interesting and insightful letter. It's true that Mitchell did not stop writing after his retirement in 1926, but I would argue that his most fertile period was over by that point. For example, his world war memoirs were simply that—his diary from the war period published after his death. His book/pamphlet on his tour in Alaska prior to World War I made no mention of airpower at all. Similarly, his biography of Gen Adolphus Greely was a discussion about the work of the Signal Corps, of which Greely was head, with a thinly disguised attempt by Mitchell to discuss his own activities. In my view, his *Skyways* book was merely a rehash of old ideas that he had written about in the early 1920s. I see nothing new in this book. So again, I would argue that Mitchell certainly did not cease writing after 1926 (he needed the money), but because he was no longer plugged into what was actually

happening in the Air Corps, combined with the fact that he seemed to run out of new ideas, his writings after 1926 are—to me—a disappointment. In short, Mitchell's most fertile period was from 1919 till 1925, when he was, essentially, the deputy head of the Air Service.

Thanks again for your wonderful letter.

Col Phil Meilinger, USAF, Retired
Chicago, Illinois

COUNTERINSURGENCY AIRPOWER

In his article "Counterinsurgency Airpower: Air-Ground Integration for the Long War" (Fall 2006), Col Howard D. Belote states that the Marine Corps "published an unsupported analysis suggesting that some Air Force JTACs' [joint terminal attack controllers'] unfamiliarity with the ground scheme of maneuver proved that the Marine Corps trained its forward air controllers better than the Air Force trained its JTACs" (p. 61).

I disagree that a formal "analysis" must be conducted to reach a conclusion. Colonel Belote's article mentions Lt Col Gary Kling; I have received Colonel Kling's brief and have spoken with him at length about Fallujah. I am a qualified JTAC who has been assigned to a USMC rifle battalion as a ground forward air controller (FAC) and division air officer. I have worked with and instructed Navy SEALs, combat controllers, Air Force enlisted terminal attack controllers, as well as Marine FACs and JTACs; the conclusion reached by the Marine Corps Center for Lessons Learned—that Marine FACs were trained better than Air Force JTACs—is exactly what I experienced. This is what the Marines experienced in Iraq, and it is what I experienced both as an F-18D weapon systems officer FAC (airborne) and during a tour flying F-15Es with the Air Force. Knowing the ground scheme of maneuver is critical to executing the ground commander's intent, and the Air Force consistently made this an afterthought. The Marine Corps has been training enlisted and officer JTACs who are nonrated for the past several years to augment a rifle battalion's FACs. Nonaviator JTACs do not perform as well as Marine pilots or Marine

naval flight officers who are serving as ground FACs. Some nonaviators are superb JTACs, but experience has shown that the Marine FACs will almost always perform better than the Marine JTAC—or any other JTAC. The data regarding academic and employment performance of students going through USMC Tactical Air Control Party (TACP) School for both prospective FACs and JTACs supports this claim. Additionally, I have discussed the training given to student Air Force JTACs and air liaison officers (ALO) at Nellis AFB, Nevada, with friends who have served as ALOs, and I have attended USMC TACP School in California. The course of instruction given by the Marine Corps is indeed a better syllabus. A quick comparison of lectures and required terminal controls necessary to complete the course will confirm this fact. Examination of the Marine Corps TACP course of instruction and the qualification of Air Force pilots and navigators as qualified JTACs may actually improve the application of airpower in support of the Army or other joint forces.

Maj C. J. "Galf" Galfano, USMC
Marine Corps Command and Staff College
Quantico, Virginia

MY FATHER AND I AND SABURO SAKAI

While doing some research on World War II Japanese naval aviators, I happened to come across Col Francis Stevens's article "My Father and I and Saburo Sakai" (*Chronicles Online Journal*, 21 June 2006). I've read about many amazing things done by members of our military, but never have I heard of something as astonishing and noteworthy as what Colonel Stevens did in his interaction with Saburo Sakai. Although Sakai was renowned for his skill and honor in aerial combat, Colonel Stevens is a great man in terms of a far more important virtue—the personal strength of character first to forgive and then to befriend a former enemy who felled not only many of his countrymen but also his own father. It was a beautiful act of humanity to which more people should aspire.

Roger Van Royen
Santa Rosa, California

THE FIRST RULE OF MODERN WARFARE

Col Richard Szafranski's article "The First Rule of Modern Warfare: Never Bring a Knife to a Gunfight" (Winter 2005) has made me think. As a Western norm, the saying "never bring a knife to a gunfight" typically reflects a Western mind-set, which differs greatly from the Oriental way of thinking. The Western way is more linear, and the Oriental is curvier.

As far as a fighter plane is concerned, an airborne machine gun can be regarded as the "knife" and a missile as the "gun." As early as the 1960s, the US Air Force stopped bringing knives, removing the machine guns from its fighter planes. Then the F-4 and MiGs had a few duels (over Vietnam) in which the former was good with guns and the latter with knives. The Air Force enjoyed a superb advantage over the MiGs at mid- and long-range fighting. But when the MiGs managed to get close and wave the knife, F-4 pilots immediately panicked. That may explain why the US fighters were soon rearmed with machine guns.

Certainly, with the development of long-range precision strike weapons and unmanned aerial vehicles, the situation changes dramatically from that of the past, setting a favorable background for the US military to bring up the same old "bring no knife" tune—that is, to stress the decisive factor of the "gun" in asymmetric conflict. The US military circle may assume that all directly manned weapons belong to the "knife" category, and eventually all aircraft, tanks, and warships will be operated by robots on the battlefield.

Well, the reality is that US forces have brought "guns" to the knife fight in Iraq, only to find themselves bogged down in it. It is therefore wiser to "keep a knife in a gunfight."

Li Jian
Chief Editor, Global Defense Web Site
Beijing, China

Editor's Note: Mr. Li read the Chinese version of this article, available at http://www.airpower .maxwell.af.mil/apjinternational/apj-c/2007/ fal07/szafranski.htm.

Expeditionary Operations

TRADITIONALLY, EXPEDITIONARY operations have called for the physical deployment of forces, but that notion is evolving. Practically all Airmen are assigned to one of 10 air and space expeditionary forces, and Air Force leaders constantly reiterate the importance of being ready to deploy. Yet, current joint doctrine defines an expeditionary force as "an armed force organized to accomplish a specific objective in a foreign country," a definition that does not specifically require physical deployment overseas.[1] Is the Air Force properly emphasizing the physical-deployment aspect of expeditionary operations?

Our service operates in the air, space, and cyberspace domains, but only the air domain lends itself to traditional expeditionary operations. Flying units typically forward-deploy personnel and equipment, establish bases, conduct operations until they achieve their objectives, and then redeploy. Expeditionary space and cyber operations involve less need for overseas deployment. Space operations place satellites in orbits that traverse the world, but space units and personnel often remain at their home stations. Cyberspace units can also perform many wartime duties without deploying.

Our chief of staff provided important guidance about expeditionary operations in his white paper on Air Force strategy, which mentions the word *expeditionary* only once.[2] However, it also touts the Air Force's "*Global Vigilance, Global Reach and Global Power*" (emphasis in original)—concepts that mean, among other things, monitoring opponents, positioning Air Force assets, destroying targets, and projecting other desired effects worldwide.[3] Despite these expeditionary-sounding attributes, the global war on terror challenges the service to demonstrate how it contributes to irregular warfare. Daily news reports describe soldiers and marines engaged in ground combat yet seldom mention Airmen. Highlighting Airmen's physical presence in the war zone may offer one way of counteracting any potential public perceptions that the Air Force is not fully engaged in the fight; however, an effects-based approach to operations would require the Air Force to concentrate on producing desired effects overseas, regardless of whether those effects come from physically deploying equipment and personnel.

Some Air Force operations are difficult to categorize as expeditionary in the traditional sense—or even as predominantly air, space, or cyber. For example, operators in Nevada remotely control unmanned aircraft systems (UAS) that fly combat sorties in Iraq. These seem to be expeditionary air operations, yet they rely heavily on space and cyberspace systems to transmit signals. In a reversal of traditional roles, the UAS's ground crew may physically deploy to the combat zone while its operators stay home. Combat assessment and other intelligence activities that transcend single domains and "reach back" to harness the talents of analysts in the United States can also resist simple categorization. However one categorizes these "cross-domain" operations, the key point is that they produce expeditionary combat effects and may represent the wave of the future.[4]

Expeditionary operations constantly morph as Airmen seek innovative ways to integrate and leverage air, space, and cyber power. Whether the Air Force is properly balancing physical deployment with an effects-based approach to operations remains to be seen, but *Air and Space Power Journal*, the professional journal of the Air Force, dedicates this issue to promoting dialogue about this vital topic. ❑

Notes

1. Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (as amended through 17 October 2007), 193, http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf.

2. Gen T. Michael Moseley, *The Nation's Guardians: America's 21st Century Air Force*, CSAF White Paper (Washington, DC: Department of the Air Force, Office of the Chief of Staff, 29 December 2007), 6, http://www.af.mil/shared/media/document/AFD-080207-048.pdf.

3. Ibid., 1.

4. Ibid., 2.

In air combat, "the merge" occurs when opposing aircraft meet and pass each other. Then they usually "mix it up."
In a similar spirit, Air and Space Power Journal*'s "Merge" articles present contending ideas. Readers are free to join the intellectual battlespace. Please send comments to aspj@maxwell.af.mil or cadreaspj@aol.com.*

Commentary on Lt Col Kenneth Beebe's "Reply to 'Defining Information Operations Forces: What Do We Need?'"

Col August G. "Greg" Jannarone, USAF, Retired
MSgt Charles G. "Chuck" Doig, USAF, Retired*

WE READ WITH some interest Lt Col Kenneth Beebe's "Reply to 'Defining Information Operations Forces: What Do We Need?'" (Winter 2007). We generally concur with his commentary; however, we wish to address the following passages:

> When it comes to influence operations, I think we need to ask ourselves if it makes sense to have a separate "influence" career field in the Air Force. . . . Since the Air Force's primary PSYOP [psychological operations] role involves disseminating the Army's PSYOP products, the authors' prescription makes this individual essentially a deception planner. . . . This doesn't require a career force so much as it requires dedicated planners whom the Air Force can train and educate in influence yet still capitalize on their prior experiences.
>
> . . . What concerns me, however, is that our Air Force leadership really hasn't decided what to do with IO [information operations]. It appears to me that the creation of Air Force Cyber Command represents the beginning of the end for IO in our service (31–32).

We offer some additional points for discussion and consideration in answer to the rhetorical question he proposes regarding a "separate" influence career field for the Air Force, the implication that the Air Force's "primary" PSYOP role is exclusively dissemination, and his concerns for IO and Air Force Cyber Command.

We agree that an Air Force specialty code (AFSC) for influence operations is unnecessary. In fact, in all practical senses (e.g., the time needed to train in multiple operational disciplines, the required educational background and assignment experience, and the logistics and personnel-management challenges of a career force), creating an influence operations AFSC is all but impossible. However, we believe that a good argument can be made for a special-duty AFSC for PSYOP. Why?

The Air Force currently uses special experience identifiers (SEI) to distinguish IO-trained personnel and has an officer SEI for PSYOP. The Air Staff is already working on an enlisted PSYOP SEI. However, the Air Force does not manage AFSCs by SEI and rarely codes unit

*Greg Jannarone, who served 27 years in the Air Force and in joint special operations, is currently director of Air University's Behavioral Influences Analysis Center and an assistant professor at the Air War College, Maxwell AFB, Alabama. Chuck Doig, who served 21 years in the Air Force as a targeteer, weaponeer, and psychological operations planner, is currently a contractor supporting the Air Force Information Operations Center at Lackland AFB, Texas.

manning documents with the necessary SEIs (especially true for PSYOP). Therefore, individuals assigned to positions requiring PSYOP training and expertise often do not receive the necessary training prior to their assignment to the position. This also makes it difficult to track individuals who already have the necessary background and assign them to positions requiring PSYOP training and expertise. A special-duty AFSC would alleviate these issues. Additionally, the Office of the Secretary of Defense, the Joint Chiefs of Staff, as well as service doctrine and policies, identify PSYOP as an operational discipline; furthermore, current Air Force IO doctrine describes it as one of several influence-operations disciplines.[1]

Joint doctrine and Department of Defense (DOD) directives require the Air Force (along with the other military departments and services) to do the following:

(1) Provide civilian and military personnel with appropriate PSYOP training and planning skills.

(2) Provide capabilities organic to Service forces to execute PSYOP actions and dedicated PSYOP forces and equipment.

(3) Develop Service PSYOP doctrine relating to the primary functions assigned to the particular Service.

(4) Provide PSYOP forces or detachments (not assigned to the Commander, USSOCOM [US Special Operations Command]) to combatant commanders for service in foreign countries.

(5) Provide departmental intelligence and counterintelligence assets that are trained, equipped, and organized to support planning and conduct PSYOP.

(6) Incorporate PSYOP instruction into Service training and education programs.[2]

Establishment of a special-duty AFSC for PSYOP would enable the Air Force to better meet its DOD-directed PSYOP responsibilities. Further, it would allow the accession of trained and experienced Air Force officers and noncommissioned officers at the mid- to senior-grade levels from AFSCs that readily lend themselves to training and application of PSYOP (e.g., AFSC 61SB—Behavioral Scientist or AFSC 16F—Foreign Area Officer). This way the Air Force can bring in the proper mix of professionals at the correct grade level, leave them in the special duty for one or two tours (so they don't kill their careers), and send them back to their original AFSC with a much broader perspective of PSYOP and IO. It would also enable Air Force personnel to receive more robust PSYOP training (most likely through the US Army) than is currently available.

We agree with Colonel Beebe that planning (and, we would add, targeting) skills are as vital to a PSYOP professional as they are to a deception professional. In fact, the Air Force possesses considerable military occupational strength at all levels of planning, from tactical through strategic. Beginning with a planner, social scientist, targeteer, or experienced aviator provides the basis for building a competent PSYOP professional.

In the Air Force, if a function has no AFSC, program element code, or organizational basis (flight, squadron, group, or even a detachment), it has no real programmatic existence. PSYOP currently lacks all of these things, and the lack of a special-duty AFSC is both a cause and consequence of this situation.

We disagree with Colonel Beebe's characterization of dissemination as the primary Air Force PSYOP mission. Certainly dissemination is the traditional or legacy role most closely associated with the Air Force—one in which the Air Force is clearly most comfortable—but we argue that the idea of PSYOP is vastly greater than delivery, dissemination, or broadcasts; in fact, these are merely the "mechanisms" used to conduct planned actions for intended psychological effects. The central idea involves conducting psychological *actions* that apply cognitive (and often social and organizational) *influence effects* on the *perceptions*, *reasoning*, and *decision making* of a specific adversary actor, other human being, or group of interest.

In fact, the Air Force can generate an enormous range of psychologically significant actions from air, space, and cyberspace domains—most of which can be planned and assessed in advance if PSYOP planning develops appro-

priate measures of effectiveness. Even the Army recognizes the inherent psychological effects of airpower and the psychological impact of all kinetic military operations. Army Field Manual (FM) 3-05.30 / Marine Corps Reference Publication (MCRP) 3-40.6, *Psychological Operations*, discusses and defines a *psychological operations action* (PSYACT) as "an action conducted by non-PSYOP personnel, that is planned primarily to affect the behavior of a TA [target audience]."[3] Accordingly, when PSYACTs are planned in support of an existing PSYOP program, the Army requires synchronous integration and execution of each PSYACT with its own products (e.g., leaflets and broadcasts).

At the end of his commentary, Colonel Beebe voices his concern that "our Air Force leadership really hasn't decided what to do with IO" (p. 32). We share his concern, and, at a more focused level, we voice the same concern regarding PSYOP and influence operations. Yet, in our opinion, there is no choice involved. The Air Force must do PSYOP. The decisions are how much, how well, and with what degree of professionalism and joint integration. We would also argue that these same points hold true for all of IO, and, unlike Colonel Beebe, we believe that the creation of an Air Force Cyber Command—assuming that our service correctly defines and adequately resources its missions and roles (especially influence operations and PSYOP)—may finally mark the beginning of full-spectrum IO within the Air Force and not the beginning of the end.   ❑

Maxwell AFB, Alabama
Lackland AFB, Texas

Notes

1. See Chairman of the Joint Chiefs of Staff Instruction 3110.05D, *Joint Psychological Operations Supplement to the Joint Strategic Capabilities Plan, FY 2006*, 8 November 2007; Department of Defense Directive (DODD) S-3321.1, *Overt Psychological Operations Conducted by the Military Services in Peacetime and in Contingencies Short of War* (U), 26 July 1984; Joint Publication (JP) 3-53, *Doctrine for Joint Psychological Operations*, 5 September 2003, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_53.pdf; JP 3-13, *Information Operations*, 13 February 2006, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_13.pdf; and Air Force Doctrine Document 2-5, *Information Operations*, 11 January 2005, https://www.hqafdc.maxwell.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd2-5.pdf.

2. JP 3-53, *Doctrine for Joint Psychological Operations*, II-6. The JP cites DODD S-3321.1, *Overt Psychological Operations.*

3. Army FM 3-05.30 / MCRP 3-40.6, *Psychological Operations*, 15 April 2005, Glossary-16, http://www.fas.org/irp/doddir/army/fm3-05-30.pdf.

As technology matures and proliferates, and as access to space becomes available to more countries, organizations, and individuals, threats to America's air, space, and cyberspace capabilities will continue to grow and evolve. America's Airmen aim to be ready to meet these and all other threats to our Nation.

—*2007 U.S. Air Force Posture Statement*

> *Editor's Note:* **PIREP** *is aviation shorthand for* pilot report. *It's a means for one pilot to pass on current, potentially useful information to other pilots. In the same fashion, we use this department to let readers know about items of interest.*

Adding Less-Lethal Arrows to the Quiver for Counterinsurgency Air Operations

Col Ernie Haendschke, USAF*

THE CONFLICT IN Iraq has enabled the war fighter to improve, and in some cases rewrite, many counterinsurgency (COIN) tactics, techniques, and procedures and has illustrated some gaps in our COIN capabilities. In this article, I explain one of those gaps in our weapons inventory and address how we resolved it to give Airmen two more weapons for supporting COIN operations. This discussion is as much about what we added to our inventory as how we added it.

In mid-2007, the war fighter identified a need for a kinetic effect to engage insurgents in urban areas during troops-in-contact engagements (a close air support [CAS] type of mission) while keeping noncombatant casualties to a minimum and allowing strikes near culturally significant or historical objects or sites.[1] Insurgents use such places as sanctuaries, negating the CAS kinetic option for certain target areas. The following description of how coalition forces identified and filled a COIN weapons-capability gap offers important lessons learned that validate the importance of having Airmen involved in planning and executing ground operations at the strategic, operational, and tactical levels. The discussion also reinforces the need for Airmen to continue their tradition of being innovative and agile as we improve our future combat capabilities across the spectrum of conflict.

Counterinsurgency Air Operations in Iraq

The Air Force has been involved across the spectrum of conflict in the Iraqi theater of operations for 18 years now. High-intensity strategic bombing campaigns took center stage during the opening weeks of Operation Desert Storm and the opening days of the "shock and awe" campaign that toppled Saddam Hussein. During this period, the Air Force also spent years patrolling the skies over Iraq enforcing the no-fly zones, providing humanitarian aid, and occasionally showcasing its precision-engagement capabilities when confronted with hostile intent according to the rules of engagement as part of Operations Southern Watch and Northern Watch.

---

*The author is professor of air and space studies at the University of Maryland and a Fighter Weapons School and Test Pilot School graduate. He deployed last year to Baghdad, Iraq, as the deputy director of the air component coordination element.

The one constant throughout this period has been our air supremacy over the skies of Iraq. Not since 1991 have US service personnel had to wonder if the aircraft flying over them in Iraq are friendly or not. We cannot take this for granted, nor should we overlook it since controlling the skies factors into all air operations that currently support the conflict in Iraq. Future conflicts, even future COIN operations, may not allow us the same luxury, so we must remain prepared to fight to achieve control of the skies and thus allow freedom of action on the ground. Today in Iraq, our airpower is just as overwhelming and dominating—but in different ways due to the nature of the conflict.

We can best categorize the conflict after our invasion of Iraq in 2003 as irregular warfare (IW), which Air Force Doctrine Document (AFDD) 2-3, *Irregular Warfare*, defines as "a violent struggle among state and non-state actors for legitimacy and influence over the relevant populations. IW favors indirect and asymmetric approaches, though it may employ the full range of military and other capabilities in order to erode an adversary's power, influence, and will."[2] This type of warfare has unique characteristics that require a different approach and associated strategies than the ones we trained in for traditional warfare. IW is characterized according to the activities required to conduct it. At its core lie insurgency and COIN.

Traditionally the military has been reluctant to maintain its IW doctrine—particularly true since the end of the Vietnam War. Prior to December 2006, the Army had not published a manual devoted exclusively to COIN for 20 years. The Marine Corps had not published one for 25 years.[3] Until 2007 the Air Force lacked official IW guidelines or doctrine except for the area of foreign internal defense. We relegated IW doctrine to the bottom of our priorities or even overlooked it for many reasons, including the following:

- It wasn't what we had trained for (i.e., it's not the kind of conflict the military wants to fight).

- It wasn't military-centric (i.e., it involves much interdepartmental and interagency coordination).

- It was hard to justify big-ticket, high-tech hardware acquisitions that are the services' bread and butter (i.e., IW relies considerably less on the high-tech hardware used in traditional war fighting).

- It is complex and difficult to successfully execute, so some people preferred to ignore it.[4]

These reasons reflect a mind-set that focused more on previous, successful force-on-force conflicts within the military's comfort zone than on less-than-successful, messy, complex conflicts outside that zone. The US military has a mixed track record in this arena in Southeast Asia, Latin American, and Africa. This myopic focus is now a thing of the past.

Since late 2003, the conflict in Iraq has highlighted this type of warfare and resulted in definitive actions. The Army and Marine Corps codeveloped Field Manual (FM) 3-24 and Marine Corps Warfighting Publication (MCWP) 3-33.5, *Counterinsurgency*, in December 2006, and the Air Force subsequently released AFDD 2-3 to help shape how the Air Force organizes, trains, equips, and sustains its forces for this type of warfare. This is all good and will ensure that future Airmen are ready for the challenges associated with IW operations and related activities, including COIN, support to COIN, counterterrorism, shaping and deterring, and support to insurgency.[5]

The Air Force currently supports COIN operations, just as it does all types of warfare, through 17 key operational functions.[6] For example, since the overthrow of Saddam and the cessation of "major combat operations," we have made extensive use of counterland; information operations; combat support; command and control; airlift; air refueling; special operations; intelligence, surveillance, and reconnaissance (ISR); personnel-recovery operations; navigation and positioning; and weather services. However, due to the nature and characteristics of COIN operations, some functions are more relevant than others and are

taking center stage. In fact we steadily increased the number of ISR and CAS sorties in 2007. For example, ISR missions by unmanned aerial vehicles in Iraq surged by nearly a third in the first six months of 2007 in conjunction with the troop buildup.[7] The number of CAS missions also grew by 30–40 percent in the spring of 2007.[8] During this time, we also increased the number of bombs dropped. In the first six months of that year, Air Force and Navy aircraft released 437 bombs and missiles in the Iraqi theater of operations, a more than fivefold increase over the 86 used in the same period in 2006 and three times more than in the second half of 2006.[9]

With the dramatic increase in unmanned aerial vehicles and the use of conventional fighters equipped with Remotely Operated Video Enhancement Receiver (ROVER) capability, the Iraqi theater of operations is seeing the evolution of new missions, currently called armed overwatch and nontraditional ISR. ROVER capability enables ground commanders and joint terminal attack controllers (JTAC) to see real-time video of the battlespace from the aircraft's perspective, thereby providing critical battlefield situational awareness and targeting capability.[10] Traditional CAS and armed reconnaissance missions have been supplemented by the armed-overwatch mission.[11] As opposed to armed reconnaissance, armed overwatch concerns itself with persistent surveillance and long dwell times—a sort of unblinking eye over the battlefield, coupled with the capability to engage lethally, when and if required. Although the MQ-1 Predator unmanned aerial vehicle is the current all-star for this type of mission, it will soon share this honor with the MQ-9 Reaper, its larger, faster, and more lethal derivative. Platforms other than the known, dedicated ISR platforms conduct nontraditional ISR—in Iraq, these are usually conventional fighters equipped with ROVER capability, which enables them to share their full-motion video with associated ground commanders. All fighter squadrons in Iraq were equipped with ROVER capability in the fall of 2007.[12] This video capability is the new gold standard for actionable situational awareness for ground commanders and their JTACs. This offers just one example of how the current conflict in Iraq is rewriting tactics, techniques, and procedures for airpower employment as we bring new technology into the Iraqi theater of operations and the conflict evolves.

Kinetic Air Operations and Counterinsurgency

Although most COIN operations emphasize nonkinetic functions, kinetic operations have their place, commensurate with the joint force commander's objectives, as recent increases in CAS missions demonstrate. Some of these missions have been preplanned strikes, but most have come as a result of troops-in-contact encounters with insurgents or during armed-overwatch missions that have caught insurgents emplacing improvised explosive devices (IED).

Economy of force, a principle of war, is very appropriate during a discussion of kinetic COIN operations. According to the latest draft of AFDD 1, "Air Force Basic Doctrine," "economy of force is defined as the judicious employment and distribution of forces. . . . Although this principle suggests the use of overwhelming force in one sense it also recommends guarding against the 'overkill' inherent in the use of excessive force. This is particularly relevant when excessive force can destroy the gaining and maintaining of legitimacy and support for an operation."[13] FM 3-24 / MCWP 3-33.5 addresses the potential for times when overwhelming force is necessary, such as destroying or intimidating an opponent or reassuring a population. But the commander must also use appropriate and measured levels of force. This entails applying "force precisely so that it accomplishes the mission without causing unnecessary loss of life, suffering," *or physical property damage.*[14] For ground forces, this means using escalation-of-force procedures to minimize potential loss of life and collateral damage (CD).[15] Combined air and space operations center (CAOC) air planners, aircrews, and JTACs have their own such procedures and a corresponding weapons inventory that they can employ to mini-

mize the potential of noncombatant casualties and the destruction of noncombatant buildings and personal property. In COIN operations, minimizing CD becomes even more of an effects multiplier during the process of trying to win the hearts and minds of the population. Any egregious CD incident will have tremendous implications for the insurgents' strategic information operations, due to the associated political fallout.

What is the right amount of force to use to ensure that we do not alienate the very noncombatant population we are trying to influence? In other words, how do we minimize CD, thereby depriving our enemies—the insurgents—of material for their own information-operations media campaign to sway the population against the host government and counterinsurgents? In Iraq the insurgents have quickly mastered both public media channels and Internet venues—for example, their use of a school as a site from which to launch rockets to draw a retaliatory strike that kills or wounds schoolchildren. If that occurs, they display those killed or wounded as innocent victims or even fabricate the aftermath to discredit the host government and counterinsurgents.

To determine the right amount of force, one must start with the law of armed conflict, which the Airman is duty-bound to observe. Among other things, the law establishes a framework for ensuring the use of lawful means of warfare. Military necessity, a basic legal principle of the law of armed conflict, states that "attacks must be limited to military objectives." It "permits the application of only that degree of regulated force, not otherwise prohibited by the laws of war, required for the partial or complete submission of the enemy with the least expenditure of life, time and physical resources."[16] The next principle, proportionality, means that "military operations must take into consideration the extent of civilian destruction and probable casualties that will result and, to the extent consistent with the necessities of the military situation, seek to avoid or minimize such casualties and destruction. Civilian losses must be proportionate to the military advantages sought."[17] In any case, the Airman must not intentionally attack civil-

ians or employ weapons that would cause excessive CD.

The next question that we must answer after considering the law of armed conflict specifically deals with the desired effects from the use of force. By *effect* I mean the desired outcomes, events, or consequences resulting from the use of force. It is not enough simply to talk about the direct effects since the second- and third-order effects of any action conducted in the battlespace may override the direct effects. AFDD 1 says that Air Force operational functions are tied to achieving specific effects.[18] The tactical effects of CAS can also have significant operational and strategic effects, based on what I call a CD-effects multiplier. Any CD will result in what we might call an exponential-multiplier effect, whereby the number of casualties or the amount and significance of property damaged determine the strike's operational or strategic negative effects. The greater the number of civilian casualties/deaths or extent of damage to civilian infrastructure (water, electricity, oil refinery, transportation, etc.) or historical/religious/cultural structures, the greater the damage to the COIN effort since this negatively affects the noncombatant population—the very people the counterinsurgents are trying to influence and win over.

Air Force Doctrine Center Handout (AFDCH) 10-01, *Air and Space Commander's Handbook for the JFACC [Joint Force Air Component Commander]* discusses effects-based principles, three of which are very applicable to COIN activities. The handbook recommends considering "the full range of outcomes, events, and consequences—not only direct (physical) but also indirect (including psychological and parallel systemwide) effects."[19] The second principle notes that we should "seek to affect behavior, not just cause physical change (even attrition is really about getting the enemy units to break or surrender)."[20] The third principle—a very critical one, especially in COIN operations—requires us to "determine ways of measuring all desired effects and objectives."[21] Without an appropriate measure of effectiveness, determining whether the activity produced the desired effect becomes very dif-

ficult.[22] Battle damage assessments as well as the aircrew and JTAC postmission reports complete the measure-of-effectiveness feedback loop that we use to determine achievement of the desired effect. This measure becomes even more significant for nonkinetic and low-CD weapons, designed to have the effect of minimizing physical damage and modifying behavior. Examples of nonkinetic methods include show of force (SOF) or show of presence (SOP) sorties.[23] Effects of these types of sorties are not easily quantifiable. For example, we used SOF sorties during the Iraqi elections to influence both the civilian population and insurgents through a series of ground-force and airpower operations.[24] In this case, we had no way of definitively quantifying the increased number of voters as a result of these sorties, but they did enable the Iraqis to hold a successful election with only minor disturbances.

For these sorties to be effective, the population and insurgents needed to know that coalition forces had both the capability and intent to engage. Equally important, the population and insurgents had to be vulnerable (i.e., outmatched in firepower and lacking defensive measures against the aircraft). In addition, the population should know that airpower supported the ground forces. To encourage the population to get out and vote, a visible presence of ground forces highlighted the SOP sorties flown at medium altitudes near polling locations. To discourage insurgents or extremists, fighter aircraft flew SOF sorties near suspected trouble areas at lower altitudes to demonstrate the coalition forces' resolve to intervene if problems developed.

In summary, the military finds itself in a balancing act in COIN operations—trying to win over the local noncombatant population, the true center of gravity for this type of warfare, while simultaneously defeating the insurgents. Unfortunately these two actions occur in the same physical space shared by both groups—especially in an urban setting. "The object of war is to impose one's will on the enemy by destroying his will" (also known as coercion) "or capability to resist" (also known as denial).[25] In COIN, when troops are in contact with insurgents, the object is exactly the same, but at the tactical level. At the same time, however, coalition forces must prevent CD so as not to alienate or lose the support of the noncombatant population. During COIN operations, noncombatant casualties and destruction of civilian objects can take on a strategic significance that insurgents can exploit, setting back months of building rapport and forging trusting relationships with the resident population. Due to this balancing act, low-CD weapons are very critical in fighting a COIN. In fact, one of the paradoxes of COIN from FM 3-24 / MCWP 3-33.5 warns that sometimes the more force one uses, the less effective one becomes.[26] Our current low-CD weapons inventory does not fully reflect these realities.

Current Inventory of Low-Collateral-Damage Weapons

For a long time, we have sought ways to increase the lethality of air-dropped weapons. This quest continues but is joined by parallel efforts to minimize lethality in certain cases. With the advent of the global positioning system and its corresponding precision capabilities, we do not always need increased lethality to achieve the desired weapons effects. The current inventory of air-dropped weapons does in fact include some of these low-CD weapons that Air Force, Navy, and Marine Corps aircraft can drop to achieve precisely tailored effects.

The Air Force has some kinetic lethal weapons that have proven successful in the current Iraqi COIN operations. First, the guided bomb unit (GBU)-39/B Small-Diameter Bomb (SDB) achieved initial operational capability on the F-15E in the fall of 2006.[27] Developed by Boeing, this bomb has been characterized as "the next generation of low-cost and low-CD precision strike weapon for employment from fighters, bombers and [unmanned aerial vehicles]."[28] An extended-range, all-weather, day-and-night, 250-pound-class guided munition, it relies on a global positioning system / inertial navigation system to self-navigate to the desired impact point.

Next, we used inert weapons during Northern Watch and Southern Watch to strike targets that threatened our aircraft enforcing the no-fly zones. Specifically, the coalition used a precision, inert GBU-12—a 500-pound, concrete-filled, laser-guided munition—to destroy selected targets without the blast effects of a live weapon.[29] The coalition employed them against threats that displayed hostile intent but were near schools or civilian structures, doing so to destroy active surface-to-air radar sites while limiting CD. Additionally, we had used the inert and live air-to-ground missile (AGM)-114 Hellfire—a 100-pound-class, laser-guided precision missile—to minimize CD effects.[30] The inert version can penetrate targets without the associated blast effects of a live warhead. Another low-CD missile carried by Air Force aircraft—the AGM-65 Maverick, a tactical, air-to-surface guided missile—has a variant with a smaller 125-pound, antiarmor, shaped-charge warhead that comes with electro-optical/television guidance (AGM-65A or B) or imaging infrared guidance (AGM-65D). In 2007 the Air Force started using the AGM-65E laser-guided Maverick, which features a larger 300-pound, penetrating, blast-fragmentation warhead (previously used exclusively by Navy and Marine Corps aircraft).[31]

The Navy and Marine Corps introduced their own specific low-CD weapon in May 2007: the bomb live unit (BLU)-126/B Low Collateral Damage Bomb, identical to the 500-pound-class BLU-111/B but containing about 16 percent less explosive mass and producing a reduced fragmentation pattern and blast radius.[32] This weapon uses the same precision-guidance kits as the BLU-111/B, including those for Paveway II laser-guided bombs (designated GBU-51/B) and the Joint Direct Attack Munition (JDAM) kits (designated GBU-38 [v] 4/B).

Does any potential exist for an even lower-CD-type weapon for specific target sets? In the future, a variant of the SDB will be available: the Focused Lethality Munition (FLM), now in development to further decrease CD, will replace the steel casing of the SDB with a composite carbon-fiber casing and will include a new dense-metal explosive fill.[33] This "multi-phased blast explosive" fill is denser than that of the original SDB and gives a slightly larger blast, but with reduced CD since the casing produces no fragmentation.[34] It creates the overall effect of a blast-only weapon with reduced lethality. The ongoing FLM test program will demonstrate that the weapon has the same accuracy as the SDB and then undergo a three-phase military-utility assessment.[35] The program office will deliver 50 residual weapons to US Central Command (USCENTCOM) for such an assessment upon completion of the joint capabilities technology demonstration in the spring of 2008. If USCENTCOM considers the assessment results favorable, the current plan calls for producing 450 more FLM weapons over the next four years.[36]

The War Fighter's Problem

In 2007 the war fighter needed a kinetic effect that fell between the nonkinetic SOF and SOP sorties and the lowest CD weapon in our inventory. The regularly used nonkinetic SOF and SOP sorties prove effective when we employ them properly in deterrent and preemptive roles. However, we needed something more when they did not produce the desired effects in a troops-in-contact engagement. The joint war fighter needed a capability to threaten insurgents directly in the urban setting. At a minimum, this weapon should have the effect of forcing the insurgents to abandon their covered positions, creating chaos, and enabling our troops to gain or retake the initiative. This "shock effect" weapon would have to reduce the fragmentary pattern more than that of current low-CD weapons to minimize physical damage and noncombatant casualties.

The war fighter needed this capability very quickly for crucial upcoming operations—that is, a weapon that we could quickly bring into the theater, as well as one already familiar to the logistics personnel who would store and transport it, the aircrews who would employ it, and the maintenance personnel who would build and load it onto the aircraft. In other

words, this weapon ideally would require only minimum training for the Airmen involved.

The Solution

The Army war fighter, together with the Airmen in Multi-National Corps-Iraq (MNC-I), identified this need. These Airmen—air planners, JTACs, and air liaison officers—assigned to the expeditionary air support operations group, are in a position to directly influence and advise Army battalion, brigade, division, and corps leadership on how airpower can support ground maneuver. At the same time, they provide feedback to the combined force air and space component commander and his staff on current issues and upcoming operations.

CAOC staff members and their Army and Air Force counterparts at Headquarters MNC-I identified this problem during one of the weekly synchronization video teleconferences. These Airmen were also aware of the inert GBU-12s used in Northern Watch and Southern Watch, mentioned earlier. The question now became whether we could use inert GBU-38 JDAMs in a similar manner to drive insurgents out of their urban sanctuaries during troops-in-contact engagements with coalition forces.

The Department of Defense has developed a process to handle just this type of problem experienced by combatant command (COCOM) war fighters. In the past, the acquisition community delivered equipment and services to a COCOM involved in an ongoing operation, using a very restrictive, cumbersome, and inefficient process. This resulted in establishment of a joint rapid acquisition cell (JRAC), part of the Office of the Secretary of Defense, that reported to the secretary of defense through the undersecretary of defense comptroller and the undersecretary of defense for acquisition, technology, and logistics. The JRAC monitors, coordinates, and facilitates meeting the COCOM's urgent, operationally driven needs via the joint urgent operational need (JUON) process.[37]

A JUON that cannot be satisfied in an appropriate time frame by a service/defense agency process goes to the COCOM for certification and prioritization. The COCOM ei-

ther rejects or certifies and prioritizes it, forwarding the certified JUON to the Joint Staff and JRAC simultaneously. With a Joint Staff recommendation, the JRAC designates or declines the JUON as an immediate war fighter need within 14 days of submission to the cell.[38] The JRAC tracks this need and facilitates its resolution. This process ensures that the need gets timely attention, undergoes cross-checking against all the services to determine whether a similar solution is either already available or being worked, and confirms the availability of current-year funding.

In this particular case, the joint team felt that a two-pronged approach would help resolve the need in time for upcoming operations. Therefore Multi-National Force-Iraq (MNF-I) submitted a JUON to USCENTCOM. Simultaneously, the MNC-I commander sent a personal memo to the combined force air and space component commander—the supporting commander and dual-hatted as the Central Command Air Forces (CENTAF) commander—requesting the inert weapons. The previous use of inert GBU-12s with their concrete warheads against low-CD-type targets had set an unofficial precedent and became an important consideration in allaying some of the concerns in this case. Additionally, as a result of the weekly synchronization video teleconferences between MNC-I air planners, air liaison officers, and the CAOC staff, the participants knew that inert weapons were already in-theater and could be quickly delivered to the appropriate bases.

Considerations for Employment of the Inert Joint Direct Attack Munition

To initially research the feasibility of employing inert JDAMs, the Air Armament Center's Seek Eagle and JDAM Joint Program Offices at Eglin AFB, Florida, were asked to comment on any carriage, release, and accuracy concerns. They were very helpful and pointed out a few factors to consider in using the inert JDAM for this particular purpose. Their foremost concern was that the inert-

warhead fill process produces inconsistent mass properties and weights that do not match the corresponding live version and can thus affect the JDAM's performance.[39] Thankfully, they found that these variances are not a significant factor for the 500-pound GBU-38 JDAM. The same could not be said for the 2,000-pound GBU-31 JDAM version, which does have large variances that dramatically affect its accuracy. Furthermore, they confirmed that, compared to the live version, these inert concrete warheads generally do not fragment much, a very important factor when trying to limit CD. Lastly, previous experience with inert GBU-12s showed a tendency of inert concrete bombs to broach or skip at shallow impact angles—but the JDAM enables the operator to plan high-impact angles that minimize risk.[40] This preliminary information revealed no significant problems with carriage, release, or accuracy.

The Results

USCENTCOM adjudicated the JUON and determined that CENTAF should examine it. Based on the specific requirements and effects desired, the CENTAF staff agreed that the inert GBU-38 JDAM would meet the needs of the JUON and deliver the effect sought by the war fighter.

The CENTAF and USCENTCOM staff working the JUON also discovered that the Navy was just taking delivery of the first of its low-CD GBU-51/Bs and GBU-38 (v) 4/Bs in the Iraqi theater of operations. However, no Air Force aircraft had been certified to carry and release these weapons. In an effort to provide the joint war fighter more flexibility when striking low-CD target areas, the CENTAF commander directed the CAOC and CENTAF staff to investigate the possibility of certifying some Air Force aircraft. After staff discussions with the Navy on weapon availability and with the Seek Eagle office regarding carriage and release certifications, the CENTAF commander decided to proceed with analysis and testing to certify carriage and release from Air Force F-16s and A-10s. Both aircraft soon received

flight clearances to carry and employ the weapons. As a result, the ground commander and his JTACs would have yet another option to deliver the effects of these particular low-CD weapons from Air Force aircraft.

The MNC-I commander's personal memo also resulted in some immediate actions. The combined force air and space component commander responded positively to the memo after examining the feasibility and suitability of the inert JDAM. This munition had a pattern of minimum fragmentation; the ordnance was already located in-theater; and the logistics and maintenance personnel, as well as the aircrews, were all familiar with the weapon's transportation, maintenance, carriage, and delivery procedures since we regularly use it for testing and training purposes.

Airlifters flew the inert GBU-38 JDAMs to Balad Air Base for immediate carriage as an option available for JTACs. The next day, F-16 fighters flew with the inert JDAMs, and the JTACs received briefings on the additional weapon available for their use. They now had a shock effect available to them for the surge operations of summer 2007, when insurgents engaged their soldiers in the urban CD setting and when Hellfire, strafing, or nonkinetic SOF options were inappropriate due to concerns about fragmentation pattern or ineffectiveness.

Lessons Learned

Lessons learned during this process apply in any future case in which the joint war fighter wishes to add an effect to the airpower repertoire. First, the quicker we can identify a need, the better, so that requirements processes can run their course, ensuring evaluation of all possible avenues. In this particular case, the ground force commander needed an effect for troops in contact in the urban setting during upcoming operations, so expediency became an overriding concern. Second, one should use all available resources early on to determine which potential options have merit and which don't, thereby avoiding the wasting of time or resources pursuing dead ends. The Airmen originating the request did their

homework to expedite the process. By contacting the Seek Eagle and JDAM Joint Program Offices early in the process, they saved a great deal of time by ensuring the absence of showstoppers before sending the personal memo. Next, the importance of having Airmen not only at the tactical but also at the operational (division and MNC-I) and strategic (MNF-I) levels ensured that we were asking the right questions regarding the desired effects, thereby enabling airpower to become more proficient in integrating with the Army's unique, time-sensitive requirements. These embedded Airmen are a conduit for Army planners and leaders as well as their JTACs on the front lines. This organizational structure guarantees that the planning for upcoming operations can apply the appropriate means to meet the objectives requested by the ground unit from the standpoints of both effectiveness and efficiency. Another lesson learned involves assuming nothing, no matter how obvious it may seem. The fact that the inert and live JDAM versions do have differences in mass properties and weight that can affect accuracies is not intuitively obvious, especially since we employ the inert weapons routinely on training sorties.

In addition, there are two very important reasons to educate the appropriate Army decision makers and JTACs once we have fielded a new capability—particularly in a fluid combat environment. First, this "expectation management" ensures that on-scene commanders realize they have another weapon they can employ and lets them know what they can expect in the way of effects. Second, it gives the ground commander and JTACs an awareness of any limitation, which guards against misuse of the new capability. Obviously, we do not want to employ limited resources against targets unless they will produce the desired results.

One other valuable lesson learned regarding combat experimentation arose after the inert GBU-38s flew in support of Operation Iraqi Freedom. MNC-I leadership wanted to try using the inert JDAMs as a counter to IEDs along roads. In theory the weapon would have detonated the IED and would not have caused much further damage to the roads, since it had no explosive warhead. This would have made road repair quick and relatively inexpensive, compared to the repair required had we used a live warhead. Since this addressed a high-priority need to defeat roadside IEDs, the Air Force agreed to the experiment despite weaponeering analysis that showed a very slim probability of success. Unfortunately, after a number of unsuccessful tests, we stopped the experimentation.

Despite this lack of success, there will be other legitimate times when we will need experimentation in combat to produce a specific effect against a specific target, particularly if the stakes are high—for example, if we were trying to quickly find a way to defeat a newly evolved tactic responsible for coalition casualties, as was the case here. However, this experimentation should proceed only after appropriate leadership has made a conscious decision after consulting a designed evaluation plan that incorporates measures of effectiveness and designed feedback mechanisms, including means of documenting the test conditions prior to and after the event. Otherwise, the results would prove suspect, and the findings would make no conclusive determinations. Employing inert JDAMs on "suspected" or "historically known" IED locations without certain knowledge of the presence of a device or its exact location is no way to conduct field experimentation.

Conclusion

Effective COIN operations require reexamination of some previously employed tactics, techniques, and procedures and the types of weapons used in conjunction with them. With the help of Airmen assigned to the expeditionary air support operations group, Army planners identified a required effect between nonkinetic SOF and the weapon with the lowest CD in our inventory. The Air Force filled the gap quickly with the inert JDAM, making it immediately available for surge combat operations during the summer of 2007. Additionally, as a result of this effort, Air Force F-16 and A-10 fighters were certified to employ the

Navy's low-CD GBU-51/Bs and GBU-38 (v) 4/Bs until the next-generation low-CD weapon, the FLM, becomes available. Both the inert JDAM and Navy's Low Collateral Damage Bomb give joint war fighters added flexibility when they need effects associated with a low-CD weapon. This ordnance will allow access to targets formerly restricted by CD limitations and make airpower more effective and lethal in COIN operations. The Airmen fighting today in Iraq and Afghanistan are continuing the fine traditions of agility and innovation, ensuring that airpower remains responsive to the needs of the joint war fighter throughout the spectrum of conflict, including COIN operations.   ❑

Notes

1. For a definition of *kinetic*, see Air Force Doctrine Document (AFDD) 2-1.9, *Targeting*, 8 June 2006, 115, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd2-1-%209.pdf.

2. AFDD 2-3, *Irregular Warfare*, 1 August 2007, 1, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd2-3.pdf.

3. Field Manual (FM) 3-24 / Marine Corps Warfighting Publication (MCWP) 3-33.5, *Counterinsurgency*, December 2006, foreword, http://www.fas.org/irp/doddir/army/fm3-24.pdf.

4. IW should never be military-centric due to the nature of the conflict. Since we are trying to influence a host population and either support the constitutional government or usher in another form of governmental organization, all elements of national power come into play, including some or all of the following: political, diplomatic, economic, informational, paramilitary, and civic actions.

5. AFDD 2-3, *Irregular Warfare*, 5.

6. AFDD 1, "Air Force Basic Doctrine," topline coordination draft, version 3, 19 June 2007, 37, lists the 17 operational functions as strategic attack; counterair; counterspace; counterland; countersea; information operations; combat support; command and control; airlift; air refueling; spacelift; special operations; intelligence; surveillance and reconnaissance; personnel-recovery operations; navigation and positioning; and weather services.

7. Lolita C. Baldor, "Military Branches Fight for Control of Drones," *Oakland Tribune*, 6 July 2007, http://findarticles.com/p/articles/mi_qn4176/is_20070706/ai_n19359009.

8. Charles J. Hanley, "U.S. Doubles Air Attacks in Iraq," *Boston.com*, 5 June 2007, http://www.boston.com/news/world/middleast/articles/2007/06/05/us_doubles_air_attacks_in_iraq.

9. Charles J. Hanley, "Air Force Quietly Building Iraq Presence," ABC News, 14 July 2007, 1, http://abcnews.go.com/International/wireStory?id=3378044.

10. SSgt Amanda Savannah, "Battlefield Technology Key to Atlantic Strike V," *Air Force Link*, 19 April 2007, http://www.af.mil/news/story.asp?id=123049599. "ROVER can receive video and telemetry data from manned aircraft [and] unmanned aerial vehicles . . . to display [full-motion video] on a laptop or television monitor. The receive-only terminal can receive most Intelligence, Surveillance and Reconnaissance video from C, L, and KU Band frequencies." Ibid.

11. Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (as amended through 17 October 2007), defines the term *armed reconnaissance* as "a mission with the primary purpose of locating and attacking targets of opportunity, i.e., enemy materiel, personnel, and facilities, in assigned general areas or along assigned ground communications routes, and not for the purpose of attacking specific briefed targets" (44).

12. Hanley, "Air Force Quietly Building," 3.

13. AFDD 1, "Air Force Basic Doctrine," 27–28.

14. FM 3-24 / MCWP 3-33.5, *Counterinsurgency*, 1-25. I added physical property damage since any damage to noncombatants' personal property also has an effect on efforts to persuade the local population that everything was done to minimize CD.

15. Ibid. According to JP 1-02, *Department of Defense Dictionary*, collateral damage is "unintentional or incidental injury or damage to persons or objects that would not be lawful military targets in the circumstances ruling at the time. Such damage is not unlawful so long as it is not excessive in light of the overall military advantage anticipated from the attack" (93).

16. See "The Law of Armed Conflict," http://milcom.jag.af.mil/ch15/loac.doc. Military objectives are those "objects which by their nature, location, purpose, or use make an effective contribution to military action and whose total or partial destruction, capture, or neutralization . . . offers a definite military advantage." "Civilian objects are such objects as places of worship, schools, hospitals, and dwellings. [These] objects can lose their protected status if they are used to make an effective contribution to military action." Ibid.

17. Ibid.

18. AFDD 1, "Air Force Basic Doctrine," 36.

19. Air Force Doctrine Center Handout (AFDCH) 10-01, *Air and Space Commander's Handbook for the JFACC*, 27 June 2005, 67.

20. Ibid.

21. Ibid.

22. JP 1-02, *Department of Defense Dictionary*, defines the term *measure of effectiveness* as "a criterion used to assess changes in system behavior, capability, or operational environment that is tied to measuring the attainment of an

end state, achievement of an objective, or creation of an effect. Also called MOE" (335).

23. SOF sorties are low-altitude flybys or dry-weapon deliveries that may or may not include expending flares. SOP sorties are used as reinforcement or reassurance. Normally we use both types for preemptive purposes in a deterrent role for the purpose of altering behavior. In the case of noncombatants, they provide a sense of security; for insurgents/extremists, they demonstrate a sense of vulnerability or a form of intimidation.

24. Lt Gen Robert J. Elder Jr., "Effects-Based Operations: A Command Philosophy," *Air and Space Power Journal* 21, no. 1 (Spring 2007): 14, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj07/spr07/spr07.pdf.

25. Col Phillip S. Meilinger, "Air Strategy: Targeting for Effect," *Aerospace Power Journal* 13, no. 4 (Winter 1999): 56, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj99/win99/meiling.pdf.

26. FM 3-24 / MCWP 3-33.5, *Counterinsurgency*, 1-27.

27. TSgt Russell Wicke, "ACC Declares Small Diameter Bomb Initially Operational," *Air Force Link*, 5 October 2006, http://www.af.mil/news/story.asp?id=123028580.

28. Ibid.

29. Dr. Thomas R. Searle, "Making Airpower Effective against Guerillas," *Air and Space Journal* 18, no. 3 (Fall 2004): 19, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj04/fal04/Fal04.pdf. Inert GBU-12s had limited success in curtailing CD during Northern Watch due to bombs ricocheting and skipping far from their intended target.

30. Vago Muradian, "An Interview with Gen. T. Michael 'Buzz' Moseley," *Defense News*, 22 May 2006, 1, http://integrator.hanscom.af.mil/2006/May/05252006/05252006-08.htm.

31. Jack Gillum, "Air Force Mulls Maverick," *Arizona Daily Star*, 22 August 2007, 1; and "AGM-65 *Maverick* Guided Missile," United States Navy Fact File, 28 August 2007, http://www.navy.mil/navydata/fact_display.asp?cid=2200&tid=500&ct=2.

32. The BLU-111/B penetrator is a thermally coated, forged-steel-casing warhead—a more accurately toleranced variant of the MK-82 500-pound general-purpose bomb. See also "BLU-111/B," *GloralSecurity.org*, http://www.globalsecurity.org/military/systems/munitions/blu-111.htm; "NAVAIR Delivers Low Collateral Damage Bomb," news release, 11 May 2007, Naval Air Warfare Center Weapons Division, http://www.nawcwd.navy.mil/nawcwd/news/

2007/2007-05_low_collateral_damage_bomb.htm; and Lt Col James Auclair, Air Force Seek Eagle office, to author, personal communication, 4 August 2007.

33. SSgt Ryan Hansen, "Small Diameter Bomb Timeline Remains on Schedule," Air Armament Center Public Affairs, 22 March 2006, http://www.afmc.af.mil/news/story.asp?id=123017916.

34. Maj Heidi Cornell, Precision Strike Weapons Program Element monitor, to author, personal communication, 26 August 2007.

35. Maj Heidi Cornell, Precision Strike Weapons Program Element monitor, to author, personal communication, 27 August 2007. The three-phase military-utility assessment consists of ground tests (static live fire), three weaponeering workshops, and live flight tests.

36. Cornell, personal communication, 26 August 2007.

37. For detailed coverage of the JUON process, see Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3470.1, *Rapid Validation and Resourcing of Joint Urgent Operational Needs (JUON) in the Year of Execution*, 15 July 2005 (current as of 9 July 2007). For the JRAC, see Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD) (AT&L), briefing, subject: Overview to NDIA [National Defense Industrial Association] Central Florida Chapter Defense Forum, 21 March 2007. A JUON is "a COCOM-certified and prioritized urgent operational need, outside DOD 5000 / military processes, requiring a DOTMLPF (Doctrine, Organization, Training, Material, Leadership and Education, Personnel, and Facilities) solution that, if left unfilled, will seriously endanger personnel and/or pose a major threat to ongoing operations." OUSD (AT&L) briefing, slide 13.

38. CJCSI 3470.1, *Rapid Validation and Resourcing*, defines an *immediate warfighter need* as "a subset of JUONs . . . [having] a materiel or logistics solution that must be resolved in 120 days or less" (GL-1).

39. Dr. Louis R. Cerrato, 678th Armament Systems Squadron/EN, JDAM office, to author, personal communication, 14 June 2007. The method of filling the warhead produces this phenomenon. The live warheads are filled vertically, and the inert, cement warheads are filled horizontally, resulting in different mass properties. Additionally, warhead weight also tends to vary more for the inerts, which tend to be lighter than their live counterparts.

40. Broaching occurs when a weapon hits the ground or target and continues downrange, similar to a ricocheting bullet or a stone skipping on water.

Fulfilling its role as a leader in the Information Age, the Air Force is exploring technologies and concepts of operations within the cyberspace domain.

—2007 U.S. Air Force Posture Statement

The Role of Air Force Civil Engineers in Counterinsurgency Operations

Lt Col Kendall Brown, USAFR, PhD, PE*

WHAT IS THE role of the Air Force's general-purpose forces in support of counterinsurgency (COIN) operations? Facilitators of the 2007 Air Force Symposium on Counterinsurgency posed that question at Maxwell AFB, Alabama, in April 2007. A presentation by David Ochmanek of the RAND Corporation analyzed areas of the world where insurgencies were present—or were developing—and in which the United States might determine that its national interests required US military involvement.[1] His analysis concluded that the Air Force does not have sufficient Rapid Engineers Deployable Heavy Operations Repair Squadron, Engineers (RED HORSE) and Prime Base Engineer Emergency Force (Prime BEEF) squadrons to sustain operations in those COIN engagements as part of the Air Force's general-purpose forces. But what is the role of its civil engineer (CE) forces in the COIN environment? What do they bring to the fight once they've established the base for the air forces supporting the joint or combined mission? Do they have any specialized capabilities? Can we simply outsource that role to a commercial entity or another service? In order to answer those questions, we must review the origins and history of civil engineering in the Air Force, examine its capabilities, and then identify its possible use in future COIN operations.

History of Air Force Civil Engineering

Beginning in 1918, the US Army established specialized units to support the needs of its developing aviation assets.[2] During World War II, aviation-engineer battalions and airborne aviation-engineer battalions were established within the Army Corps of Engineers to construct, repair, and defend Army Air Corps airfields in overseas theaters.[3] After the formation of the US Air Force in 1947, facility construction for Air Force bases remained a Corps of Engineers responsibility.[4] However, "to perform combat engineering support, an agreement was reached whereby the Army would organize, staff and train units placed under Air Force operational control for the exclusive support of the USAF mission. Those battalions were designated Special Category Army with Air Force."[5] When the Korean War began in 1950, these units had low readiness levels because of their unique status as US Army battalions assigned to the Air Force. Although the aviation-engineer battalions performed tremendous feats during the Korean War, the resource, organizational, and command and control challenges created by this relationship indicated that the Air Force needed organic units with specialized capabilities for airfield construction and repair. World events in the late 1950s and early 1960s (Lebanon in 1958, Berlin in 1961, and the Cuban missile crisis in 1962) "demonstrated a need for mobile CE teams ready for immediate deployment to perform construction work during wartime or other emergencies."[6] The Air Force created the Prime BEEF team concept in 1965 to give it the capability to respond to such emergencies. As the service became more involved in Vietnam, it once again required heavy-repair capabilities with more equipment, skills, and personnel than Prime BEEF teams could pro-

vide; therefore, the Air Force created dedicated CE squadrons—RED HORSE—to address this need.[7]

CEs have supported Air Force contingency operations throughout the world since the Vietnam War, including those resulting from foreign and domestic natural disasters as well as terrorist attacks. Beginning in the 1980s, a Cold War period in which the Air Force seldom used CEs' contingency capabilities, many of its active duty and Reserve units began participating in foreign-military-assistance missions in Central America, South America, and the Caribbean. These deployments served several objectives, primarily providing real-world, contingency-like training for unit personnel. Secondarily, however, during these deployments, CEs would construct or repair local hospitals, schools, roads, bridges, or other infrastructure projects, providing significant benefits to the local populace. Air Force CEs continue to participate in exercises such as New Horizons, conducted annually by US Southern Command with a joint and combined force to provide humanitarian assistance.[8] The exercises improve joint-training readiness of US engineers as well as medical and combat service-support units through humanitarian- and civic-assistance activities. Each New Horizons exercise lasts several months, offering much-needed services and infrastructure, while giving deployed US military forces invaluable training. These exercises generally take place in rural, underprivileged areas. US Southern Command attempts to combine these efforts with those of host-nation doctors, either military or civilian, to make them even more beneficial.

Capabilities of Air Force Civil Engineers

Air Force CE capabilities consist of three primary functional areas and associated specialized mission areas, the former including (1) facility and infrastructure construction as well as operation, maintenance, and repair of pavements, structures, water systems, electrical systems, fuel systems, lighting, aircraft arresting systems, and base sanitation; (2) aircraft and structural firefighting and personnel rescue; and (3) explosive ordnance disposal, including the detection and disposal of unexploded ordnance and improvised explosive devices. The expertise in specialized mission areas includes augmentation of staff engineering, emergency management, and response to explosive as well as chemical, nuclear, biological, and radiological incidents.

In contingency situations, CEs present tailored forces to the theater commander as Prime BEEF or RED HORSE teams, proportional to the mission requirements.

> [Prime BEEF] teams are rapidly deployable, specialized civil engineer units, that provide a full range of engineering support required to establish, operate, and maintain garrison and contingency airbases. The primary mission of Prime BEEF is to provide civil engineer support for the beddown of personnel and aircraft. Prime BEEF capabilities include airbase site surveys, establishing bare base camps and operations and utility system installation.[9]

"RED HORSE units are self-sufficient, 404-person mobile heavy construction squadrons capable of rapid response and independent operations in remote, high-threat environments worldwide."[10] One of the more recent evolutions of civil-engineering capabilities occurred during fiscal year 2005, when "RED HORSE added an 'airborne' capability to rapidly deliver light personnel and equipment packages by airdrop, air insert, or air transport means."[11] Air Force engineers are integral members of contingency-response groups, structures that facilitate accomplishment of the activities discussed later in this article.

Air Force civil engineering relies upon the Total Force to fulfill its mobility missions, with a substantial portion of its capabilities residing in the Air Force Reserve Command and Air National Guard. In fact, members of the Reserve and Guard often come to the deployment with knowledge, skills, and experience that exceed those of their active duty counterparts due to previous active duty service and their civilian careers.

Applying the Air Force's Civil Engineer Capabilities in Counterinsurgency Operations

The primary mission of CEs is to provide combat support to the theater commander's forces during all phases of the joint campaign.[12] Usually, this consists of initial operations to bed down the deployed forces, followed by sustaining operations and a series of enhancements to provide the force better facilities and services. Planning COIN operations is unique. Not a linear, sequential process, either it involves phases that occur concurrently, or, as a minimum, the operation planning in one phase explicitly considers the intended and unintended effects on other phases. Likewise, the operations themselves may be somewhat unconventional. In these COIN and irregular-warfare operations, we should also use CEs unconventionally—even in direct mission roles. We can use the organic capabilities of the deployed Prime BEEF or RED HORSE teams to establish and operate the contingency air base and furnish personnel, skills, and equipment to conduct influence operations. Planning in this environment requires a paradigm shift, and the theater commander must draw upon the capabilities of all of his or her forces.

At the beginning of joint operation planning to provide COIN support to a host-nation government, the Air Force must determine the capability and condition of airfields from which it could operate and provide that information to the planning cells. If adequate information is not already available, a CE advance planning team, either a staff-assistance team or a group of CE officers and noncommissioned officers, could visit the airfields and perform surveys and assessments.[13] If the condition of the airfield is so uncertain that landing a mobility aircraft is not advisable, the recently added airborne RED HORSE capability might conduct the assessments and begin expedient repairs. In Afghanistan during Operation Enduring Freedom, CE teams performed assessments of captured Taliban airfields and performed battle damage assessments (from

our own bombs) to determine how to repair the runways rapidly for use by coalition aircraft.[14] On the opposite extreme, when the Air Force became engaged in Operation Deliberate Force, with most of the combat aircraft deployed to Aviano Air Base, Italy, the resident CE squadron, with support from specialized planning teams, performed the majority of the planning.[15]

In more remote locations, a planning team assesses the airfield's pavements, facilities, utilities, and fire protection, as well as surveys it for explosives. The pavement evaluation determines which aircraft the runway, taxiways, and parking aprons can support. The facility assessment evaluates the existing hangars and buildings to determine their suitability for aircraft maintenance, operations, and billeting. The survey of the utility system assesses the condition, capacity, and compatibility of the airfield's electrical, water, sanitation, and fuel-storage and -distribution facilities. The CE planning team coordinates with Air Force security forces to identify construction work required to improve air base defense, such as revetments, fencing, fighting positions, and clear zones. If the airfield happens to serve international commercial aviation, it will already have fire-protection personnel and equipment; however, smaller airfields may have little equipment or trained personnel. CE firefighters will assess the existing capabilities and determine the equipment and personnel required to support deployed military aircraft. The final members of the advance team—explosive-ordnance-disposal personnel—will survey the area for unexploded ordnance, mines, improvised explosive devices, or other explosives. These planning activities are the textbook areas required for any Air Force forward deployment, but in the COIN environment, the CE advance team must look outside the airfield and get a feel for the local area and needs of the civilian population. The joint operation planning team uses these airfield assessments of the contingency operating base or forward operating base as it conducts force-structure and deployment planning.

CEs usually arrive at the airfield along with security forces, communications, and control-

lers to establish the air base and prepare for the arrival of the rest of the deployed units. After the air base becomes operational, CEs can transition from mission support to mission operations. In many situations, the deployed location will not require much effort to sustain base operations, so the majority of the engineers can either be redeployed or assigned to other campaign-support activities. Each phase of the joint campaign plan can use CE capabilities to generate the theater commander's desired effects.

During the "shaping" and "deterring" phases, CEs can participate in influence operations through engagement with the civil populace outside the air base. Their heavy equipment can improve or construct roads; drill wells to provide clean drinking water; and repair or construct schools, hospitals, and community facilities. Hiring local workers as part of the construction crew for as many of these projects as possible serves several purposes. First, local workers are less likely to be influenced by the insurgency if such jobs provide the means to meet the economic needs of their families. Second, the projects, in and of themselves, help demonstrate to the local population both their government's support and that of the United States. Either we can employ local laborers directly to work side by side with US forces, or contractors with the Air Force Contract Augmentation Program can hire local contractors. Developing these contractors offers a way of spurring economic development and promoting the professional business practices necessary for a modern marketplace. Using local laborers to support construction projects also has the corollary benefit of reducing their opportunity to participate in insurgent activities. If a local is working on a job site doing manual labor, he is less likely to cause trouble than if he had nothing to do all day, thus buying time to address issues underlying the insurgency.

CEs have recent experience doing this work in the Horn of Africa. In 2004 the 823rd RED HORSE Squadron participated in Combined Joint Task Force - Horn of Africa, providing humanitarian assistance and contingency construction projects in Djibouti, Ethiopia, and Kenya.[16] The RED HORSE team repaired roads and bridges, built a 1,000-square-foot clinic and a 3,000-square-foot school house, and renovated Ethiopian military billeting.[17] Capt Javier Velazquez, leader for the school project in Jijiga, Ethiopia, succinctly explained the importance of these operations: "When we first arrived, the people acted like, 'What are you doing here?' By the time we finished, people would rush out of their homes to wave at our convoys, realizing that we were there to help."[18]

An innovative role for Air Force CEs may exist in the "dominate" phase of the joint campaign plan. In an effects-based-operations planning/targeting approach, the desired effects may require destroying infrastructure (airfields, roads, bridges, power distribution, water, etc.) in regions held by the insurgency. As part of the planning process, we should assess the long-term effects of attacking that infrastructure. Part of that assessment should determine whether we need to reconstitute the system during stability operations. A possible slogan for such a concept—*If you decide to break it, plan to fix it*—exemplifies the synergism and parallelism between the "dominate" and "stabilize" phases.

If we make a reconstitution-planning process integral to the targeting process, we can restore infrastructure in a timely manner, enabling a quicker transition from conducting stability operations to enabling civil authority. In an extreme example, upon approval of the air tasking order (ATO) to destroy an infrastructure system, we can submit a work request to begin planning for the Army Corps of Engineers or Air Force CEs to rebuild it. Using only the level of force necessary to achieve the desired effects will help preclude a more difficult reconstitution. Implementing such an approach would not be difficult. Leaders of the RED HORSE or Prime BEEF deployment teams could participate in the ATO planning cycle to evaluate the longer-term effect of striking buildings, roads, bridges, water supply and distribution systems, electrical supply and distribution systems, fuel supply and distribution systems, and so forth. The air and space operations center's planning cell,

in conjunction with the host nation, nongovernmental organizations, and political analysts, can identify the COIN effects if we rapidly restore that system. By tracking and prioritizing the target list, along with conducting poststrike battle damage assessment to evaluate the exact damage, we can initiate planning to avoid significant delays in reestablishing services.

CE officers would require supplemental training if we want them to interact with the flight-operations community and the ATO process.[19] CE forces have the technical knowledge to perform this role, but they would also need the cultural and COIN-specific attitude in order to actually perform it. CEs and other general-purpose support forces would supplement the ATO planning cell. Such support would probably require augmenting the typical CE deployment team with one to three field-grade officers and four to six senior noncommissioned officers. Actual implementation of the reconstitution effort may or may not lie within the capability and capacity of the deployed engineering team; therefore, we may need a combatant-commander-level team to manage the reconstitution project list and conduct the planning. In many cases, the preferable method will involve utilizing the local population, either under direct contracting or as hired labor under the direction of US forces or contractor advisers.

Once we establish the airfield for use by coalition forces, it inherently provides a capability for economic development. RED HORSE can further develop the runway, taxiways, aircraft-parking ramps, airfield lighting, and fuel storage and distribution systems to support commercial passenger and cargo aircraft. With Air Force firefighters deployed and providing fire protection for aircraft, they can support the local community by training and developing a professional fire department that meets international aviation standards. As long as Air Force forces are deployed, they can continue to offer assistance in the local communities. However, during the "stabilize" and "enable civil authority" phases, the Air Force team needs to move into a coaching, mentoring, and training role, providing the skills, knowledge, and experience for the local government to become self-sufficient.

Many recent US operations in foreign nations such as Kosovo, Kuwait, and Iraq have relied upon commercial companies for a significant number of the combat-support functions such as billeting, operation and construction of base infrastructure, messing, and transportation.[20] In turn, this reliance on contractors has led to cuts in the number of combat-support personnel.[21] Deciding whether to use either US military combat support or civilian contractors requires good understanding of the local population's cultural, political, and social environment. In some COIN environments, having US uniformed personnel might prove less productive than utilizing civilian contractors. Prior to Operations Enduring Freedom and Iraqi Freedom, the media was very sensitive to the killing or injuring of US civilians in conflicts. More recently, however, that sensitivity has changed, and the media is seemingly more focused on casualties of US uniformed military than of civilian contractors. It is almost as if the media and the public view such contractors as mercenaries who voluntarily accept the risk, while airmen, soldiers, or marines have no choice in the matter. In a COIN environment, it usually isn't possible to identify a distinct front line, and the entire area of operations may experience combat at any time. This situation might lead the commander to desire that US military members serve as support personnel, with the legal authority to conduct hostile actions. Conversely, if the local area has a predisposition against the United States, the commander might want to minimize the footprint of uniformed personnel by hiring civilian contractors. Doing so creates an interesting conundrum for the commander, requiring him or her to fully evaluate the mission structure using an effects-based-operations approach and in-depth understanding of the local culture.

COIN operations also commonly feature a higher degree of joint-force integration, with most forces coming from the various services' special operations communities and supplemented by other units. As the US military becomes more involved in COIN operations,

demand will exceed the supply of existing special operations forces. We may construct conventional units to support the mission, combining rotary- and fixed-wing aircraft from all services with ground-combat forces. Combat support can come from any of the services, with US Army Corps of Engineers, US Naval Construction Forces, and Air Force CEs all capable of providing base construction and operation. However, the Army has primary expertise in ground-combat engineering (breaching berms, bridging rivers, etc.), and the Navy in facilities and bases to support its ships in the deployment area; Air Force CEs have specialized capabilities to support air bases. According to Air Force doctrine, when the Air Force supplies the preponderance of air assets, then an Airman should serve as the joint force air component commander; similarly, when most air assets come from the Air Force, Air Force CEs should support them.[22] Doing so helps preclude miscommunication and issues with command and control relationships; furthermore, it avoids relearning the lesson of Korea regarding the Special Category Army with Air Force aviation battalions.

Conclusion

Air Force CEs, in the form of deployable Prime BEEF and RED HORSE squadrons, provide required capabilities for constructing, repairing, and operating contingency and forward operating air bases. CEs offer the necessary experience, equipment, training, and personnel if the Air Force needs to operate from such airfields to fight terrorists or provide training and assistance to a friendly nation's fight against an insurgency. The COIN environment offers unique opportunities for Prime BEEF and RED HORSE to supply direct mission support. When they go outside the base and help improve infrastructure by meeting a need for clean water, repairing the electrical

system, or fixing roads, they help win the hearts and minds of the local populace. When they employ locals in construction projects, providing economic support as well as the skills and training necessary to improve their future, they take power away from the insurgency. When the indigenous population can return to a normal life soon after combat operations stop, it builds up less resentment towards US forces, further diminishing the insurgency's recruitment. The constructive capabilities that Air Force CEs have for leaving the local population with safer, more reliable infrastructure may go much farther towards supporting US national interests than the destructive capabilities of Air Force weapon systems. According to Air Force Manual (AFM) 3-2, *Civil Engineering Combat Support Doctrine,*

> Air Force civil engineers are ambassadors representing the Air Force and the nation, both overseas and at home. The professional image projected in relations with other people is often vital to furthering the nation's political and military objectives. Builders by trade, engineers provide a nonthreatening military presence that can provide lasting benefits through training and nation building while at the same time affording the security of a US Government commitment.[23]

Returning to the proposition raised by the RAND researcher during the COIN symposium, we see that the ability of existing Prime BEEF and RED HORSE units to support COIN operations depends upon the number and intensity of operations they are asked to support. Although Air Force civil engineering can provide the theater commander with capabilities needed to support the COIN operation, we have only a limited supply of CEs and their equipment. If the Air Force is asked to increase its involvement in COIN and irregular-warfare environments, we will need additional Prime BEEF and RED HORSE resources to avoid unsustainable deployment rates. ❑

Notes

1. Adam Grisson and David Ochmanek, "The Long War: Demands for USAF Capabilities" (presentation to the 2007 Air Force Symposium on Counterinsurgency, Maxwell AFB, AL, April 2007).

2. Dr. Ronald B. Hartzer, "Foundations for the Future: A Brief History of Air Force Civil Engineers," 1, http://www.afcesa.af.mil/shared/media/document/AFD-070607-002.pdf.

3. Ibid., 2.

4. Ibid.

5. Don K. Tomajan, "A Korean War Retrospective: Aviation Engineer Contributions to the Air War in Korea," *Air Force Civil Engineer Magazine* 9, no. 4 (Winter 2001–2): 13.

6. Hartzer, "Foundations for the Future."

7. Ronald B. Hartzer, "RED HORSE History," Air Force Civil Engineer Support Agency, http://www.afcesa.af.mil/library/factsheets/factsheet.asp?id=8760.

8. "New Horizons 2007," United States Southern Command, 12 September 2007, http://www.southcom.mil/AppsSC/factFiles.php?id=11.

9. "United States Air Force Prime BEEF Units," United States Air Force Fact Sheet, https://www.my.af.mil/gcss-af/USAF/AFP40/Attachment/20070703/Prime%5fBEEF%5ffact%5fsheet%5f2006.pdf (accessed 28 January 2008).

10. "United States Air Force RED HORSE Squadrons," United States Air Force Fact Sheet, https://www.my.af.mil/gcss-af/USAF/AFP40/Attachment/20070709/REDHORSE%5ffact%5fsheet2007%5f000.pdf (accessed 28 January 2008).

11. Ibid.

12. Joint Publication (JP) 3-0*, Joint Operations*, 17 September 2006, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_0.pdf, identifies the six phases of the joint campaign plan as shape, deter, seize initiative, dominate, stabilize, and enable civil authority (xxi).

13. "United States Air Force Prime BEEF Staff Augmentation Team (S-Team)," United States Air Force Fact Sheet, https://www.my.af.mil/gcss-af/USAF/AFP40/Attachment/20070703/S%5fTeam%5fFact%5fSheet.pdf (accessed 28 January 2008).

14. See TSgt Ginger Schreitmueller, "A Combat Fix: Combat Controllers, RED HORSE Join Forces to Open Mazar-e-Sharif Airfield," *Air Force Civil Engineer Magazine* 10, no. 1 (Spring 2002): 8–9, 11.

15. The Air Force Civil Engineer Support Agency has several teams that provide specialized civil-engineering mission support. For example, the Airfield Pavement Evaluation Team offers detailed evaluation of airfields and detailed repair and maintenance suggestions, and the Civil Engineer Maintenance, Inspection, and Repair Team does depot-level maintenance and repair of electrical generators, electrical-distribution systems, heating and air conditioning systems, and aircraft-arresting systems. See TSgt Michael A. Ward, "Pavements Team Brings Expertise to the Fight," *Air Force Civil Engineer Magazine* 9, no. 4 (Winter 2001/2002): 9.

16. Capt Matthew "Scott" Stanford, "RED HORSE Rides 'Round the Horn,'" *Air Force Civil Engineer Magazine* 13, no. 1 (2005): 18.

17. Ibid., 20.

18. Ibid.

19. Such specialized expertise might be a good role for the Reserve component. In particular, individual mobilization augmentees assigned to active duty CE units attached to units dedicated to COIN operations could regularly interact and train with the "operators" over a number of years. If necessary, we could activate and deploy them with the team to provide such support.

20. In some cases, the shift towards contractor-provided base-support functions offered a means of reducing the appearance of US military involvement. In other cases, the shift occurred because of previous reductions in military mission-support personnel and high operations tempo.

21. Because of the need to increase funding to the Army for continued activities in Operations Enduring Freedom and Iraqi Freedom, as well free up funds to replace aging Air Force aircraft, program budget decision (PBD) 720 resulted in the (ongoing) cut of 40,000 active duty and 17,000 Reserve-component Air Force personnel. Such an action often affects Air Force specialty codes (AFSC); specifically PBD 720 required cuts to CE AFSCs. However, to help alleviate the effect on wartime readiness, we moved positions from base engineering to RED HORSE to maintain necessary war capabilities. See Maj Gen Del Eulberg, "Transforming the CE Career Field," *Air Force Civil Engineer Magazine* 15, no. 1 (2007): 4–7.

22. Air Force Doctrine Document 2, *Operations and Organization*, 3 April 2007, 39, http://www.dtic.mil/doctrine/jel/service_pubs/afdd2.pdf.

23. Air Force Manual (AFM) 3-2, *Civil Engineering Combat Support Doctrine*, 26 April 1991, 24–25. (Note that this manual is now obsolete.)

Timing Is Everything

Operational Assessment in a Fast-Paced Fight

Lt Col Kirsten R. Messer, USAF*

T HE AIR AND SPACE operations center (AOC) "provides operational-level [command and control] of air and space forces as the focal point for planning, executing, and *assessing* air and space operations" (emphasis added).[1] Within the AOC, the assessment function resides in the operational assessment team (OAT), part of the Strategy Division. As the name implies, the OAT conducts assessment at the operational level of war and evaluates the effectiveness of air and space operations in creating desired effects and achieving the joint force air component commander's (JFACC) objectives. Based on this evaluation, the OAT recommends changes to the JFACC's strategy.

Traditionally, we view operational assessment (OA) as part of the air tasking cycle, often depicted as a wheel (fig. 1). In a high operations tempo (OPTEMPO) environment, OA must function *inside* the 72-hour air tasking cycle. This article offers a procedural framework, based on the air tasking cycle, which depicts the changing relationships between assessment and the other parts of the cycle as the pace of operations increases. This framework considers inputs to and outputs from the OAT. It offers insight into the assessment process and provides the necessary context for developing and implementing process refinements within the AOCs.

Additionally, the article presents an abstract framework based on Col John Boyd's observe-
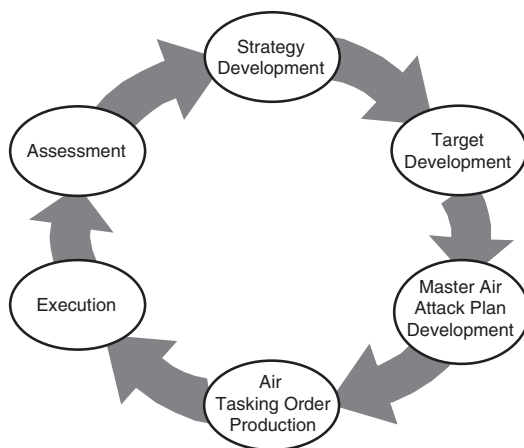
Figure 1. The air tasking cycle. (Adapted from Joint Publication 3-30, *Command and Control for Joint Air Operations*, 5 June 2003, III-23, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_30.pdf.)

orient-decide-act (OODA) loop. This conceptual framework provides additional insight into some of the key challenges of providing decision-quality assessments in a high-OPTEMPO environment. Furthermore, although presented in the context of command and control of air and space operations, this framework has broader applicability. It offers a theoretical context for understanding assessment as an enabler of effective decision making in all services, at all levels of war, and even in the context of business decisions in the private sector.

Shifting Assessment Focus inside the Air Tasking Cycle

The air tasking cycle "provides a repetitive process for planning, coordination, allocation, execution, and assessment of air missions."[2] As figure 1 shows, it begins in the Strategy Division with strategy development. The strategy plans team develops the joint air and space operations plan and passes it to the strategy guidance team, which issues guidance via the air operations directive and passes it to the targeting effects team. The targeting effects team then creates the draft joint integrated prioritized target list. The next step in the cycle calls for development of the master air attack plan (MAAP), the JFACC's "time-phased air and space scheme of maneuver for a given ATO [air tasking order] period."[3] The cycle then proceeds to ATO production and then to execution. The final step in the cycle—assessment—evaluates whether air and space operations are creating the desired effects and achieving the JFACC's objectives. The assessment team recommends changes to strategy, and the cycle starts over again.

Within this framework, we think of assessment as occurring between execution and strategy development, which implies that the most important relationships for the OAT are with the Combat Operations Division (execution) and the other teams within the Strategy Division (strategy development). The Combat Operations Division provides the primary input to the OAT, which sends output to the primary recipients—the strategy plans team and strategy guidance team.

Looking first at inputs to the OAT, we clearly see the vital connection between assessment and execution, the latter representing the part of the air tasking cycle that creates effects. Understanding and interpreting those effects is one of the most basic functions of assessment.

Equally important though, the OAT must have a comprehensive understanding of the plan, gained only by participating in the planning process, much of which is conducted by the strategy plans team. During planning, the OAT helps define objectives and tasks, specifying performance and effectiveness measures to use in assessing progress. Without a strong connection to the other teams in the Strategy Division, the OAT will not truly understand the objectives and desired effects it assesses, and assessment will fail.

Even that connection is not enough, however. The strategy-development process yields an operational-level conceptual presentation of the plan, but in some cases, the OAT needs a tactical-level depth of understanding. To acquire such understanding, the team needs to have knowledge of the targeting effects team and MAAP as well as the changes being made to the ATO on the operations floor. Information must flow into the OAT from all parts of the air tasking cycle. It must have connections to every other part of that cycle at all times. Figure 2 depicts the main inputs to the OAT, the darker arrows indicating that the connections to strategy development and execution are the most crucial.

As OPTEMPO increases, the relative importance of the connections to the other functions shifts. At a low OPTEMPO, most of the changes to the plan occur in strategy development. Tactical-level operations unfold at a relatively slow pace. In this unhurried environment, planners rarely make substantive changes to the joint integrated prioritized target list, MAAP, or ATO after their production.
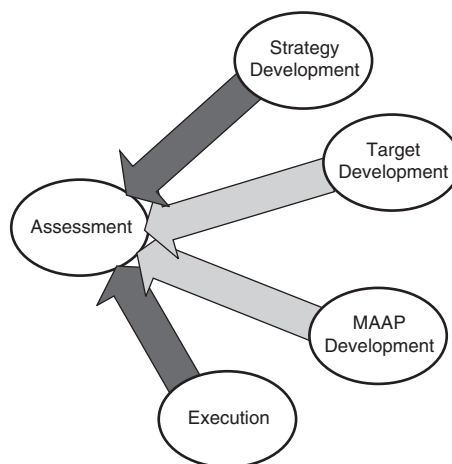
Figure 2. Information flow into the OAT

As things start to speed up, however, substantive changes begin to occur later in the cycle. Increases in OPTEMPO have the most substantial impact at the tactical level of war. Even at extreme OPTEMPOs, the operational-level plan naturally changes at a more measured pace than the tactical plans that support it.

Take air superiority for example. The operational-level plan to achieve air superiority by rolling back the enemy's Integrated Air Defense System (IADS), destroying enemy aircraft on the ground, populating defensive-counterair combat air patrols, and employing theater missile defense systems probably will not change significantly as the OPTEMPO increases. Certainly, we wish to do those things faster, but the overall plan will remain essentially the same.

The situation at the tactical level, however, is very different. Changing conditions in the battlespace will drive changes to the targeting effects team and the MAAP. At extremely high OPTEMPOs, the bulk of the changes to the plan may occur during execution via the dynamic targeting process. This implies that, in order to maintain a comprehensive understanding of the plan as the pace of operations increases, the OAT must strengthen its connection to the tactical-level plans. At the same time, assuming the team has already developed a solid understanding of the operational plan, it may be able to reduce its focus on changes

at that level. Figure 3 depicts the changing relationships as OPTEMPO increases.

A similar shift in focus occurs with respect to information flow *out of* the OAT. The true value of assessment lies in offering commanders the opportunity to change course and avoid possible pitfalls, rather than reacting to events after the fact. The OAT does this by means of predictive assessment—its projection of what the assessment will be at some point in the future. In order to leverage these projections, the commander must have a mechanism to incorporate recommended changes into the plan—specifically, in the air tasking cycle, the OAT feeds those recommendations into the strategy-development process.

That approach is well suited to a low-OPTEMPO environment. During steady-state peacetime operations, for example, the commander's desired effects are broadly defined and develop slowly—over a matter of months or even years. In this environment, plans develop at a correspondingly slow pace. The OAT can pass any observations to the strategy plans team for additional consideration and planning; such observations will work their way through the other teams as part of the normal cycle.

As the pace of operations increases, however, the commander may need to implement changes more rapidly. In that case, rather than feeding changes to the strategy plans team
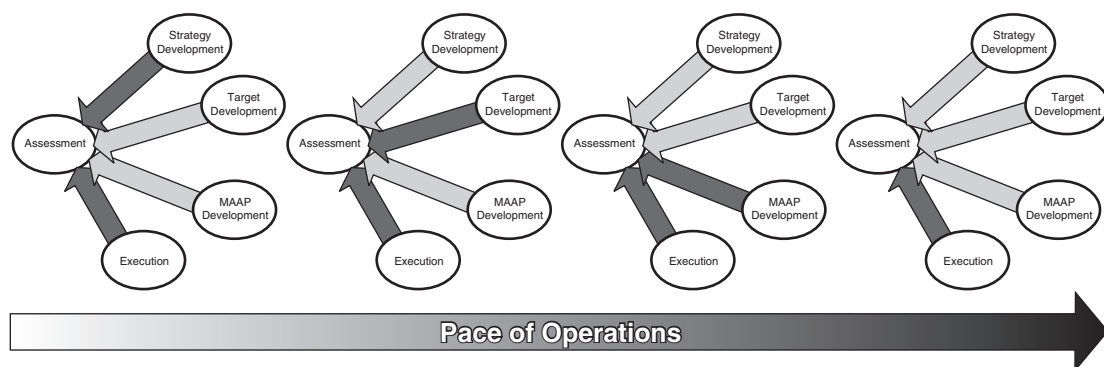
Figure 3. OAT inputs and increasing OPTEMPO. (From the author's personal discussions with Maj Joe Morgan, Annapolis, Maryland, 12–14 June 2007.)

and strategy guidance team and allowing those changes to progress through the normal cycle, the OAT may need to make recommendations directly to one of the other teams. Suppose, for example, that the assessment identifies a potential problem with the JFACC's plan which warrants a change to the MAAP. The OAT should pass that change simultaneously to the strategy plans team, the strategy guidance team, and the MAAP team. The OAT should never bypass the strategy-development function entirely. Any changes to the JFACC's guidance must be reflected in an updated air operations directive which should then be disseminated. However, passing the change to the MAAP team at the same time would enable its members to begin working it, knowing that a change to the air operations directive is forthcoming (fig. 4).
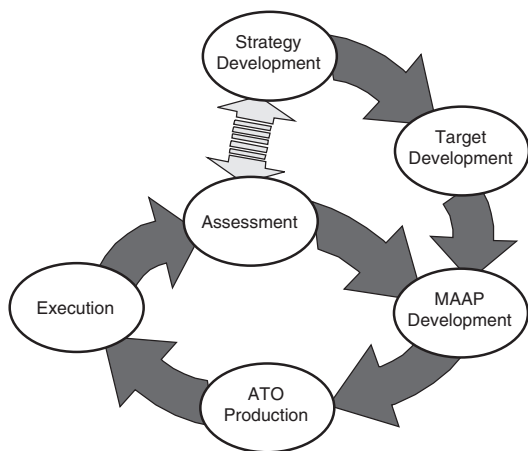
Figure 4. OAT output to the MAAP

Extending this idea, figure 5 shows that as the pace of operations increases, assessment feedback moves further inside the air tasking cycle, while maintaining a persistent connection to strategy development. At the highest OPTEMPOs, assessment may provide feedback directly to the operations floor, perhaps recommending adjustments several times during a single ATO period.

In fact, this is quite often the way things work in practice. Verbal guidance provided by the JFACC in various settings is relayed to the appropriate team or teams even before revision to the air operations directive has begun. For example, during a recent exercise that involved fast-paced operations and a great deal of dynamic targeting, the JFACC received OA updates several times a day. In fact, during the most critical operations, the OAT provided him an update every two hours. If he had any concerns, they went immediately to the operations floor, where personnel made the necessary adjustments. The next air operations directive then incorporated the cumulative effect of these changes.[4]

In the author's experience, however, this is often a very informal process, usually involving much reinventing of wheels. To provide the JFACC with the best possible assessment, the OAT must have a solid understanding of the plan and a way to implement recommended changes. During a fast-paced fight, this must occur *inside* the 72-hour air tasking cycle. AOCs should formalize the existing ad hoc practices and use this procedural framework to stimulate discussion as well as lay the

Pace of Operations
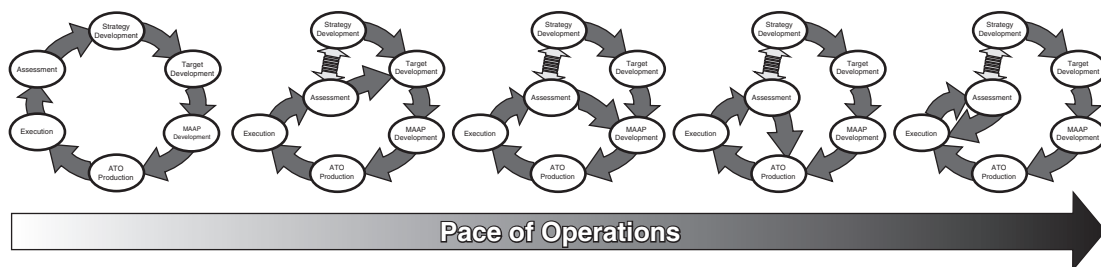
Figure 5. OAT outputs and increasing OPTEMPO

foundation for process improvements within the AOCs.

The approach described here, based on the air tasking cycle, offers a solid procedural framework for OA in a high-OPTEMPO environment within the AOCs. However its applicability remains rather narrow in scope. We develop the air tasking cycle, a task-oriented structure, to codify the tasks and intermediate products necessary to produce and execute an ATO. It is not well understood within the joint community or, for that matter, within the Air Force (outside the AOC). Assessment, particularly the effects-based variety, requires a broader theoretical structure to support discussion of the complex concepts and relationships involved. The next section describes such a structure.

Assessment and the Observe-Orient-Decide-Act Loop

The framework described above concerns itself with process improvements within the AOCs. This section, based on Colonel Boyd's OODA loop, develops a conceptual framework for discussing some of the problems plaguing assessment at high OPTEMPOs.

Colonel Boyd "thought that any conflict could be viewed as a duel wherein each adversary observes (O) his opponent's actions, orients (O) himself to the unfolding situation, decides (D) on the most appropriate response or counter-move, then acts (A)."[5] He noted that

> the process of observation-orientation-decision-action represents what takes place during the command and control process—which means that the O-O-D-A loop can be thought of as being the [command and control] loop. The second O, orientation—as the repository of our genetic heritage, cultural tradition, and previous experiences—is the *most important part* of the O-O-D-A loop since it shapes the way we observe, the way we decide, the way we act.[6] (emphasis in original)

Looking at assessment in this framework, we see that OA serves as part of the "orientation" piece of the JFACC's OODA loop. The OAT collects observations—usually lower-level assessments—and synthesizes them to enable the JFACC's orientation and, hence, effective decision making. This context sheds more light on why so many problems arise when we attempt to conduct assessment within the air tasking cycle during high OPTEMPO. The higher the OPTEMPO, the faster the JFACC's OODA loop must go in order to keep up. When that loop operates faster than the 72-hour air tasking cycle, assessment must keep up with it or become irrelevant.

The OODA-loop framework applies to assessment at all levels of warfare. At the combatant commander (COCOM) or joint task force (JTF) level (strategic/operational), campaign assessment provides orientation for the joint force commander's decisions. At the component level (operational), OA provides orientation for the component commander's decisions. Lastly, at the tactical level, tactical assessments of various forms provide orientation for tactical-level decisions. For example, battle damage assessment (BDA) may indicate that a target was not successfully destroyed, leading to a restrike recommendation, or perhaps an assessor on the combat-operations floor will notice a pattern in the incoming mission report (MISREP) data that will lead to an adjustment in tactics. In all cases and at all levels, assessment serves an orientation function (fig. 6).

Not only does the OODA-loop framework apply at all levels of war but also, by examining relationships between the loops at different levels, we gain insight into some of the common problems plaguing assessment today. If assessment is fundamentally an orientation function, then the products of assessment serve two customers. First and foremost, they serve the decision maker at whatever level of war the assessment is conducted (the "decide" part of the OODA loop). Second, they serve as observations to enable orientation at the next-higher level. Figure 7 shows the relationships between OODA loops at different levels of war.

Suppose, for example, that a JTF commander is making a go/no-go decision as to whether or not to launch an amphibious assault on an adversary, and he has directed the JFACC to gain the requisite degree of air supe-
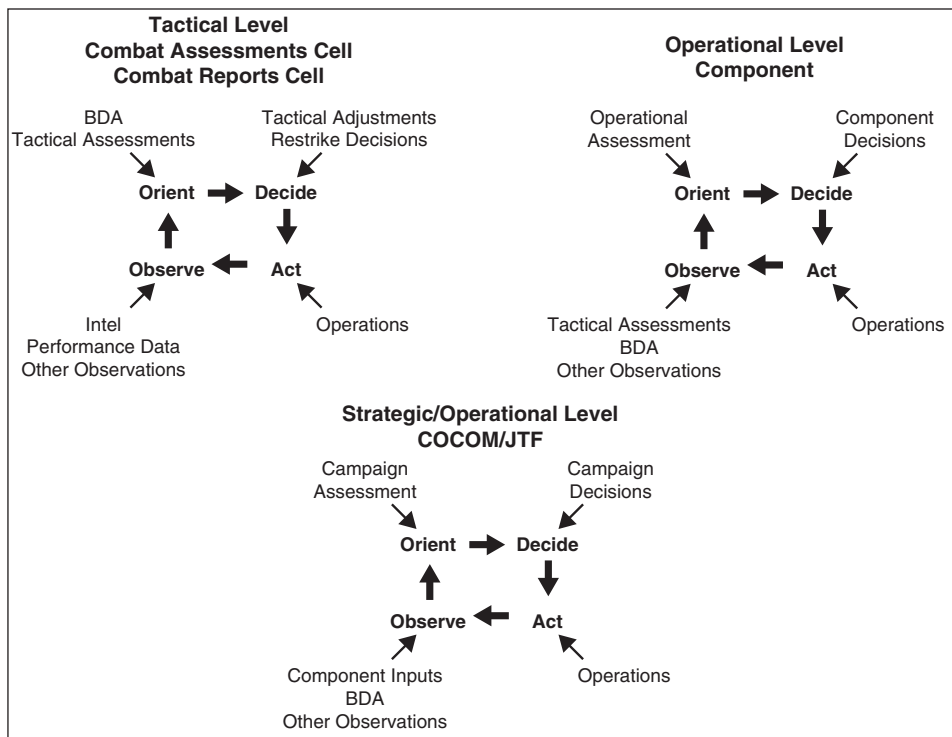
Figure 6. The OODA loop and assessment at different levels of war
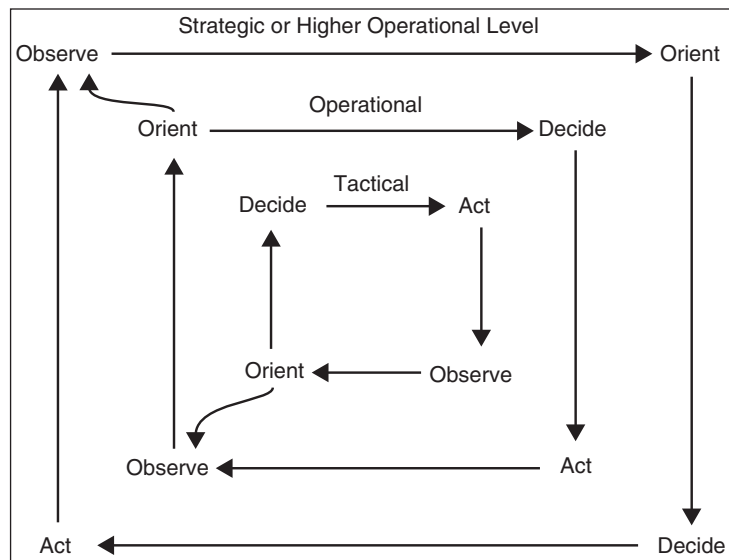
Figure 7. Relationships between OODA loops. (From the author's personal discussions with Maj Eric Murphy, Hickam AFB, Hawaii, 23–27 April 2007.)

riority to support the assault. Because the JFACC is concerned about the surface-to-air threat, he has struck a number of the enemy's IADS targets.

Looking at the tactical-level OODA loop, the JFACC's BDA team will collect information about those strikes from a variety of sources (observations). They will synthesize the observations and determine whether or not the target has been destroyed (orientation). They will then issue a BDA report that will go to the OAT (as an operational-level observation) and, if necessary, make a recommendation to restrike the target (input to decision maker).

At the operational level, the OAT will receive the BDA report (observation), using that information, along with a number of other inputs, to determine whether or not our forces have established air superiority (orientation). The team will pass the result to the JFACC (input to decision maker), who will alter his operations accordingly, and to the JTF (as a higher-level observation).

Finally, at the JTF level, the campaign assessment team will be informed that the JFACC is assessing whether he has attained the required degree of air superiority (observation). Team members will synthesize that observation, along with inputs from the other components and their own observations of the battlespace (orientation), and make a recommendation to the JTF commander regarding whether or not to proceed with the amphibious assault (input to decision maker, fig. 8).

Many of the most widespread problems with assessment at high OPTEMPOs result from disconnects between OODA loops at different levels. Take data collection and management, for example. As most people who have done OA will attest, the OAT usually spends 90 percent of its time and manpower gathering and managing data, leaving only 10 percent devoted to synthesizing the data and producing the assessment.

When confronted with the data-collection and management issue, many people immediately assume that it is a technical problem
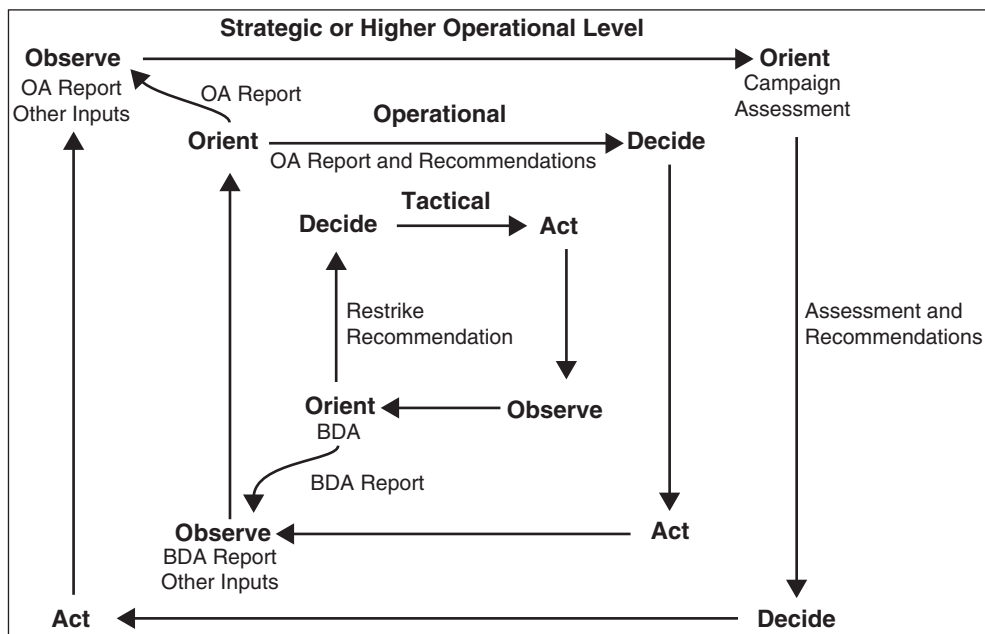
Figure 8. Amphibious assault example

with a technical solution. Often, the proposed solution takes the form of an automated data-collection system or a massive database. Automated data handling *would* offer an improvement over the current approach, but no amount of automation will address the root cause of the data-management issue: a failure of tactical-level orientation processes.

According to the framework, tactical assessments (the product of orientation at the tactical level) serve as the primary inputs (observations) to the OAT. Sometimes, however, the tactical-level orientation necessary to develop inputs to the OAT doesn't actually happen. In rare cases, this results from a complete breakdown of the tactical-assessment process. Usually, however, that process works just fine within the context of the tactical-level OODA loop. In these cases, the problem emerges from a disconnect between the tactical-level OODA loop and the operational-level loop, which can occur in several ways. Sometimes we have no process in place to align them. Sometimes we lack sufficient manpower to execute the process. Sometimes the OAT has

not effectively communicated its requirements to the tactical-assessment teams. And sometimes the operational-level OODA loop moves so fast than the tactical-level processes can't support it. This last reason, especially problematic, becomes more likely as the pace of operations increases.

Regardless of the cause, the result is the same. The OAT doesn't get the observations it needs. Team members must then either try to drive the orientation functions at the tactical level or resort to collecting tactical-level *observations* and try to do tactical- and operational-level orientation simultaneously.

It is nearly impossible to modify tactical-level orientation processes on the fly, particularly in a high-OPTEMPO environment, so the OAT often ends up attempting both tactical and operational assessments. In such cases, the OAT tries to collect a select few high-priority tactical observations and synthesize them into an operational-level assessment (fig. 9). This approach tends to be inefficient. It is usually not feasible for a single team to do both tactical- and operational-level orientation
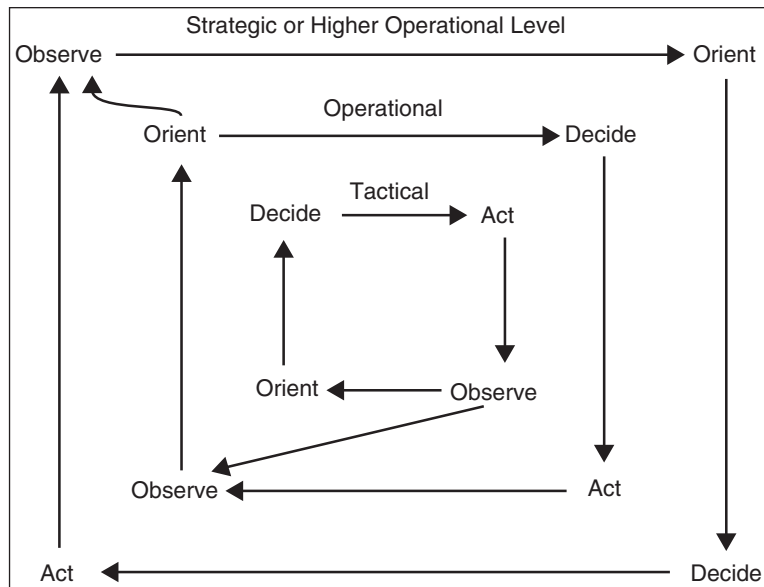
Figure 9. Misaligned OODA loops

simultaneously. The OAT generally has to do at least *some* tactical-level orientation to identify the important observations before beginning its operational-level orientation process. This approach also relies heavily on the OAT's comprehensive understanding of the plan to accurately determine the most important tactical observations and rapidly fuse them into an assessment. It can work if the OAT includes the right people, but it represents a Band-Aid rather than a true solution.

Consider the processing and handling of MISREPs during a recent exercise. When MISREPs come into the AOC, they are tactical-level observations. Although one should not attempt in-depth analysis of MISREPs during the heat of battle, *some* tactical-level orientation can be done during ongoing combat operations. Ideally, the combat reports cell or other appropriate team would review the MISREPs as they come into the AOC and issue a periodic report summarizing their content. This did not happen. Instead, the combat reports cell on the operations floor passed hundreds of MISREPs to the OAT via e-mail, over 90 percent of which indicated that the pilot had nothing significant to report. The OAT spent hours opening these e-mails and documents to find the half-dozen MISREPs that *were* significant. Only then could team members begin to interpret the content of the reports in the context of the JFACC's objectives. In this case, the data-management problem facing the OAT was a direct result of the failure of the tactical-level orientation function.[7]

The long-term solution to the data-collection and management issue entails investing the necessary resources and effort in tactical-level orientation. We should exercise the BDA process routinely during peacetime to enable a smooth transition to major combat operations. Furthermore, we should codify and exercise tactical-level assessment processes for friendly operations, including procedures for handling MISREPs.

Another issue that frequently arises deals with the exchange of assessment data between the JTF (or other higher headquarters) and the air component. Again, many of these problems can be traced to disconnects between the component's and the JTF's OODA loops. In this case, however, the *lack* of orientation at the lower level does not constitute the problem. Instead, often the JTF prefers to reserve the operational-level orientation function for itself and may disregard the orientation that occurs at the components. By requiring the components to provide what essentially amounts to observations rather than completed assessments, the JTF puts itself in a position of having to perform both the component-level and JTF-level orientation functions. This also increases the workload on an already stressed OAT that must now collect observations for transmission to the JTF in addition to performing the orientation function for which it is designed. This problem also arises at low OPTEMPOs, but in the author's experience, it tends to be more pronounced at high OPTEMPOs.

Although this practice results in duplication of effort and lower-fidelity assessment at the JTF level, it is easier to rectify than the data-collection issues. After all, the orientation occurs at the component, and the resulting product is available to the JTF whenever it cares to receive it. The key to resolving this disconnect involves building strong relationships between the JTF and component assessment teams before the shooting starts. By building this foundation, the organizations will come to understand and respect each other's processes. Coordination and data flow will improve, the OODA loops will align with one another, and the assessment processes at both levels will improve.

As these examples demonstrate, using the OODA loop as a conceptual framework offers insight into some of the more complex issues surrounding assessment in a fast-moving fight. Applying across the services and across the levels of war, it can be used to investigate and evaluate the connections between assessment processes at different organizations or levels. In general, it opens the door for development of assessment processes to handle nearly any situation in which the commander needs to make a decision and wants assessment as part of his or her orientation.

Conclusions

Assessment rapidly contextualizes and synthesizes a high volume of data to enable the JFACC's decision making. To do that well, the OAT must maintain a current, comprehensive understanding of the plan and a process for implementing recommended changes. The faster the operations proceed, the quicker the JFACC must make decisions—and the more valuable assessment becomes.

At these higher OPTEMPOs, the OAT must operate inside the 72-hour air tasking cycle. This article has offered a procedural framework to serve as a starting point for the development of disciplined processes for information flow to and from the OAT in a high-OPTEMPO environment. The approach outlined here allows assessment feedback to flow to the right teams quickly and efficiently, and maintains the connection to the Strategy Division—a link essential to preservation of a strategy-to-task approach.

In addition to the procedural framework described in the first half of the article, the OODA-loop construct serves as a conceptual framework for assessment. The loop's structure allows examination of connections between organizations operating at different levels of war. It offers a conceptual structure to enable understanding of some of the complex ideas and relationships involved in assessment. Finally, it illuminates some of the roadblocks to effective assessment. Hopefully, some of the insights it reveals will bring assessment one step closer to its true goal—enabling effective decision making at all levels.   ❑

Notes

1. Air Force Doctrine Document (AFDD) 2, *Operations and Organization*, 3 April 2007, 105, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/AFDD2.pdf.

2. AFDD 2-1, *Air Warfare*, 22 January 2000, 50, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd2-1.pdf.

3. AFDD 2-1.9, *Targeting*, 8 June 2006, 41, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd2-1-%209.pdf.

4. Author's personal experience during Exercise Talisman Sabre, May 2007.

5. Franklin C. Spinney, "Genghis John," US Naval Institute *Proceedings* 123, no. 7 (July 1997): 47.

6. John R. Boyd, "Organic Design for Command and Control" (slides), May 1987, slide 26, http://www.d-n-i.net/boyd/pdf/c&c.pdf (accessed 30 June 2007).

7. Author's personal experience during Exercise Talisman Sabre, May 2007.

True to our history over the past century of powered flight, the Air Force continues to maintain the most complex, diverse and ambitious Science and Technology . . . portfolio of all the Services.

—*2007 U.S. Air Force Posture Statement*

Air-Intelligence Operations and Training

The Decisive Edge for Effective Airpower Employment

Col D. Scott George, USAF
Lt Col Robert Ehlers, USAF*

Through technological advances and Airmen's ingenuity, we can now surveil or strike any target anywhere on the face of the Earth, day or night, in any weather. . . . Because ISR [intelligence, surveillance, and reconnaissance] capabilities are at the core of determining . . . desired effects, ISR has never been more important during our 60 years as an independent Service. ISR has become the foundation of Global Vigilance, Reach, and Power. The ISR transformation initiatives we are beginning will further enhance our ability to fly and fight as America's Air Force.

—Gen T. Michael Moseley

America's Intelligence Airmen are precious resources, engaged daily at the forefront of securing our Nation's security objectives.

—Gen T. Michael Moseley

Intelligence is operations as we move into the 21st century.
—Lt Gen David Deptula

The Changing Nature of War: Intelligence Moves to the Center

Since the attacks by Muslim extremists on the World Trade Center and Pentagon on 11 September 2001 (9/11), both the world and the practice of war have changed in fundamental ways. Perhaps the most important of these changes has been an exponential growth in the importance of agile and actionable intelligence. This is so, not just because a new generation of technologies has emerged to facilitate such an alteration, but because the enemies we fight today—elusive, ruthless, technology savvy, and extremist—represent a new kind of threat, one requiring a commensurate change in our intelligence efforts.

Since 2001 the Air Force has quietly taken center stage in the ISR effort, from the em-ployment of unmanned aerial systems (UAS) to dissemination of near-real-time intelligence. For example, the Air Force's Distributed Common Ground/Surface System provides well over half of all operational intelligence to the combatant commander.[1] Yet, this contribution would be impossible if we did not have superbly trained Airmen to operate these kinds of vital ISR assets. Without the intelligence schoolhouse at Goodfellow AFB, Texas, these "precious resources"—as General Moseley, the Air Force chief of staff, calls intelligence Airmen—would not get the insights they need to mature into the world's best intelligence professionals.

The changes in warfare since 2001 have included an array of problems that demand sophisticated and precise intelligence analysis. The act of striking time-sensitive targets is an

---

intelligence-dependent process that would be impossible without the ability to track high-value individuals, locate insurgent camps and areas of operations, and engage in many other critical ISR actions that not only act as force-multipliers but also serve as the "forces" that drive our successes. To help defeat our enemies, intelligence professionals are employing sophisticated new training methodologies, technologies, and analytical techniques; sharing sources and methods very effectively; and coming together organizationally in ways not seen since World War II. Our intelligence Airmen are indeed precious resources. We may not win all our wars with them, but we will lose without them.[2]

Echoes:
Intelligence Operations and Training in World War II

Intelligence has always been a critical force-multiplier, but its importance to operational successes became absolutely vital during World War II. The Allies' breaking of German ciphers paid huge dividends. Similar successes occurred in the Pacific, where the Allies broke key Japanese codes, resulting in victories from Midway to the submarine campaign that isolated the Japanese home islands from their sources of supply.[3]

Nearly as important was the development of a sophisticated *intellectual infrastructure* for Anglo-American air intelligence. This included highly trained intelligence specialists; new technologies such as signals-intelligence systems, advanced reconnaissance aircraft and cameras, and the tools required to exploit imagery; operational experience built on the solid foundation laid by intensive training; and an unprecedented degree of organizational coordination and cooperation that began among British agencies and came to include Americans.[4]

In the training arena, Americans took their lead from the British. For instance, British leaders hired intelligence personnel with the greatest aptitude for their particular specialty. They also put these people in positions that suited

their talents after sending them through a rigorous training program. Combat-experienced analysts then returned to train new recruits. Finally, the British held their troops to the most stringent of standards while giving them authority to make analytical judgments. Our countrymen quickly followed suit.[5]

Most important of all, however, the Allies developed an organizational structure in which intelligence sharing and coordination were the norm, and within which one specific organization or agency had responsibility for making the decision on a given analytical or operational intelligence issue. This organizational excellence, along with superb training, proved to be an essential aspect of Allied successes. This was particularly evident during the heavy-bomber campaigns that destroyed the German transportation and oil infrastructures in 1944–45, crippling the German military, reducing Allied casualties, and speeding the end of the war in Europe. Sadly, for a variety of reasons beyond the scope of this article, and despite the development of some relatively sophisticated targeting capabilities within Strategic Air Command during the Cold War, the air-intelligence expertise amassed during World War II withered until only a shadow remained.[6]

For the first time since 1945, the Air Force is once again moving rapidly in the direction of a vigorous intelligence program, establishing new organizations such as the ISR Agency with specific mission sets as well as making each intelligence organization within the Air Staff and other commands responsible for specific programmatic, operational, and training responsibilities. Most importantly, Air Force senior leaders recognized the rapidly increasing importance of intelligence by creating an entirely new deputy chief of staff position, the USAF/A2, with authority to make the changes required to bring intelligence into the twenty-first century. In fact, the chief emphasizes that the first step in this process will be "to realign functions within the Headquarters Staff to establish the AF/A2 as the single focal point and lead for all Air Force Intelligence, Surveillance, and Reconnaissance capabilities."[7]

Renaissance: Terrorist Attacks of 9/11, a New War, and the Air-Intelligence Resurgence

Assessments of military effectiveness cannot, therefore, be reduced to the amounts of physical damage or destruction inflicted on targets, the quantities of military equipment damaged or destroyed, or even to the numbers of combatants directly wounded or killed. Instead, issues of operational-strategic effectiveness will also necessarily involve human plans, intentions, psychology, political ends, and other hard-to-quantify factors and considerations.

—*Gulf War Air Power Survey*, vol. 2, pt. 2

The long post–World War II neglect of air intelligence came to an abrupt end on 9/11. With the United States at the center of targeting efforts by Muslim extremists, the enemy appeared easy to identify—at least at the macro level. However, once the initial campaigns in Afghanistan and Iraq ended, the nature of both wars changed. We and our allies found ourselves mired in counterinsurgencies, nation building, and anti-civil-war duties. Consequently, these campaigns demanded entirely new air-intelligence capabilities. Fortunately, the same building blocks that made the 1944–45 air campaigns so successful are re-emerging. Perhaps the key elements of this new intellectual infrastructure are air-intelligence troops and the sophisticated technologies they continue to master at ever-higher levels of proficiency. In the wars we are waging, and will wage, these troops will become one of the final arbiters of success.[8]

The technologies that our air-intelligence specialists leverage in these new kinds of wars are also vital to our successes because of the enemy we fight. Consequently, ISR assets (including Army, Navy, and Marine platforms) are the foundation of virtually every military success. The key role of air intelligence is highlighted by efforts to locate, observe, characterize, track, and engage extremist high-value individuals. In several cases, the full range of assets, from human intelligence to airborne ISR platforms and Distributed Common Ground/Surface Systems as well as national technical means, has come together to provide unprecedented situational awareness, detailed characterization of targets and their support networks, and the terminal tracking and engagement data required to kill our adversaries. Yet, air-intelligence assets are transforming how we fight in other, less obvious ways—for example, miniaturized and full-sized UASes that safeguard ground forces from ambush. Time-sensitive targeting offers yet another example. Increasingly sophisticated technologies and capabilities now allow intelligence personnel to direct pilots, ground forces, and other combatants to targets in minutes instead of hours or days. Young Airmen are developing these new skills at the Goodfellow AFB schoolhouse—the Air Force center for intelligence training and a key producer of intelligence specialists for all the services.

The Training Revolution: Troops, Technologies, and Methodologies

The ongoing intelligence-training revolution is the product of three components: personnel, state-of-the-art technologies, and creative teaching methodologies. Our airmen, soldiers, sailors, and marines form the center of the training effort—they will carry the fight to our adversaries. The chief emphasized this when he noted that "our Intel Way Ahead also addresses end-to-end Intelligence Airmen career force management, from the focus of our initial technical training to how we develop our intel professionals into leaders."[9]

Although the troops currently in training are among the best ever to pass through the schoolhouse portals, the real force-multipliers in their training regimen are new training technologies that introduce high degrees of realism, dynamism, and unpredictability into exercise play, and vastly improved teaching methodologies that emphasize analytical skills. Put simply, training technologies give exercises the look and feel of the war we are currently fighting.

One new modeling and simulation technology, for instance, allows for dynamic exercise play by processing students' inputs in sophisticated ways to produce outcomes designed to reward sound analysis and careful employment of ISR assets while penalizing poor analysis and employment. If players send a high-value ISR asset into harm's way without checking the enemy order of battle or requesting escort by friendly fighters, they often lose the asset and must prosecute the rest of the fight—including intelligence-collection management and targeting—without it. Similarly, making poor choices when building their "collection deck" (the assignment of ISR assets to collect against various targets) will considerably reduce the effectiveness of air strikes and other attacks.[10]

The current suite of training technologies enables students to practice intelligence functions at all levels of war, from unconventional, low-intensity, tactical engagements to conventional, high-intensity, force-on-force conflicts. Advanced modeling and simulation technologies that use UAS feeds, satellite-orbit displays, moving-target-indicator software, and sophisticated message-delivery capabilities arrayed in a realistic environment much like an air and space operations center have changed the face of intelligence training in new and dramatic ways.[11]

For instance, signals intelligence (SIGINT) analysts are employing a new generation of classroom tools that allow them to listen to and see military activities in their target language, carried out in real-world situations by our current and potential adversaries, thus giving them a real-world flavor we could barely have imagined even two years ago. These training modules come complete with static, background noise, different dialects, and a host of other challenges designed to push young "SIGINTers" to the limits of their capabilities.[12] In coordination with national agencies, the schoolhouse is leveraging technologies never before offered to the Department of Defense, all of which will soon enable young apprentices to practice even more extensively on real-world mission data collected by a variety of ISR assets. Just as impressive, these kinds of technologies enable students to map not only

communications networks but also human networks, zeroing in on high-value individuals, infiltrators, and rogue elements.[13]

The same advantages accrue to students in the analytical-intelligence tracks. Both SIGINTers and traditional all-source analysts benefit from advanced technologies that allow them *to work together* in a capstone exercise that pushes their learning curve to the limit while giving them an opportunity to see what expertise, intuition, and analytical insights their counterparts bring to the table in the ISR division of an air and space operations center. These Air Force analysts are now working with Army SIGINT mission managers who use advanced training technologies to help student "targeteers" pick high-value, high-threat, and time-sensitive ground targets. Similarly, new technologies will enable communications and electronic-intelligence specialists (the two SIGINT subspecialties) to bring near-real-time intelligence to the table, further enhancing realism. This effort to bring all varieties of intelligence specialists together for intensive training creates crucial synergy for the fight.[14]

Troops and technologies represent a vital duo, but new teaching methodologies are equally important. These rely not only on instructor preparation but also on a steady influx of combat-tested instructors to the schoolhouse. They involve leading-edge teaching techniques that combine intensive instruction, frequent practical exercises, and maximum leveraging of new and emerging technologies. In the officers' course, for instance, students now focus on analytical skills from the second week of a nearly seven-month-long course, and they employ these deepening skills during every exercise. All students must deliver an ISR employment briefing in which they analyze a real-world scenario from previous operations in Iraq or Afghanistan, determine optimum employment of scarce ISR assets, and present their plan to instructors. The debriefings that come afterwards are often delivered by combat-experienced instructors who know where students went wrong—or right—and drive this home with personal experiences. Yet, instructors also ensure that students recognize they will operate in a complex, real-world environ-

ment in which inspired analysis is difficult and perfect analysis impossible. In this, they take their lead from General Deptula, the USAF/A2, who notes that "you can't expect predictions with 100 percent success in intel work, and you shouldn't, because then we drive motivations to tell the leadership what they want to hear."[15]

The employment of combat veterans as instructors is a key linchpin in the current training renaissance. A significant issue, therefore, and one the intelligence community is working hard to address, is the necessity of making the schoolhouse an attractive assignment for Airmen. Fortunately, senior leaders recognize the importance of realistic joint training to the success of the intelligence enterprise. Consequently, they reward personnel who perform well at the schoolhouse with excellent assignments upon completion of their teaching tours. During the selection board conducted by the intelligence leadership board in 2007, all five of the officers considered from Goodfellow received competitive director-of-operations or wing director-of-intelligence assignments.[16] The promotion picture is also improving dramatically. And so it must if we are to meet General Moseley's and General Deptula's vision of Air Force intelligence as "the preeminent intel organization in the U.S. military, with the most respected intel personnel and the most valuable intelligence, surveillance, and reconnaissance . . . capabilities."[17] Put simply, this all begins with leading-edge training. If we cannot attract and reward the best people to teach at the schoolhouse, then we will graduate mediocre students.

In line with this emphasis on operational currency, training squadrons hone their instructors' skills and teaching currency by deploying them to field sites for short or extended periods. Conversely, the schoolhouse hosts a huge array of subject-matter experts, active duty and retired senior intelligence officers, and leaders from national intelligence agencies, all of whom bring vital perspectives to both students and their instructors while simultaneously building ties between intelligence organizations.[18]

New Directions: Total Force, Joint Force, and National Agencies

One of the often-overlooked truths of intelligence training is that it would come to a screeching halt without a Total Force effort. Civilians, both civil service and contractors, play a vital role at the schoolhouse as instructors, network engineers, technologists, resources experts, manpower experts, registrars, and training managers. We cannot complete the mission without them. The same is true of our Guard and Reserve personnel, who play similarly key roles. This is truly a Total Force effort. Even more fundamentally, it is also a joint effort.[19]

Approximately 25 percent of the instructors at Goodfellow are from our sister services. This presence is as crucial as the joint student presence. Indeed, for the first time, intelligence students from all services are training together—a huge force multiplier since it provides insight into the kinds of intelligence work each service does best and, more importantly, brings those discrete areas of expertise together to provide a synergy that would otherwise be absent. In a telling statistic, nearly 80 percent of intelligence specialists from our sister services come through the schoolhouse for initial or advanced training—or both.[20]

Jointness is vital, but interaction with national agencies is also crucial—and we are building relationships with these key players as well as leveraging their training assets. Efforts with the National Security Agency in particular are paying handsome dividends as the schoolhouse receives increased funding and leading-edge training systems that allow us to bring together national and military intelligence personnel and products in new, essential ways.[21]

Air-Intelligence Training and the Air-Intelligence Revolution

The air-intelligence revolution currently under way is itself part of a larger phenomenon driven by rapid changes in warfare and

concomitant intelligence requirements since 9/11. To an unprecedented degree, the tactics, techniques, and procedures for employing ISR assets rely on close cooperation between military and national intelligence organizations and agencies, all of whom bring unique attributes and capabilities that facilitate time-sensitive targeting, long-term surveillance and target characterization, nodal analysis of human and nonhuman target systems, vectoring of combat aircraft and ground troops to the proper targets, and myriad other tasks. Yet, training lies at the heart of all of these successes. According to an old proverb, "The more we sweat in peace, the less we bleed in war." This is particularly true of intelligence training because it gives us the tools to safeguard American and allied lives while maximizing the effects we achieve against our enemies. Nonetheless, we still have much to do.

Tasks: Bringing the Air-Intelligence Revolution to Maturity

We need to complete several operational and training actions in order to maximize our intelligence capabilities. The first involves deepening our joint and national focus and interactions in terms of both training and operations. Closer interaction at the schoolhouse can address the former, but only *the development of a new intellectual infrastructure*, in which military and civilian intelligence organizations and agencies come together in more intense and orderly interactions, can take us the rest of the way.

Second, we must continue to *leverage leading-edge technologies.* Closely tied to this is the key requirement that we employ this equipment to *train like we fight.* The capstone exercise at the schoolhouse is moving rapidly in this direction. It enables instructors to deliver realistic, dynamic, and unpredictable training that maximizes learning and allows students to profit from both good decisions and bad ones at no cost to our troops in the field.

Third, we must push hard to *make our "Focus on Goodfellow" efforts a success.* These include attracting the most qualified, combat-tested instructors to teach the next generation of intelligence specialists and bringing in the leadership cadre necessary to tie the larger effort together. Needless to say, this effort will fail if we do not reward these troops for their willingness to come to the schoolhouse. Without this human talent, we will not succeed. We must remember the World War II experience: our best Airmen went from the fighting front to the schoolhouse in order to train the next cadre of troops. On the other side of the coin, the schoolhouse is working to fend off an ever-growing list of deployment taskers, which, taken collectively, threaten to slow or even halt several vital courses. A deployment load that takes instructor numbers below the minimum needed to teach the full range of intelligence courses would have major second- and third-order effects in the field, where fewer intelligence specialists—and less-well-trained ones—wage a losing battle to keep up with the enemy's ever-changing tactics, techniques, and procedures and threat-system employment. We cannot afford to undercut instructor numbers and quality at the schoolhouse.

Fourth, and on a related note, *we must continue to leverage the huge pool of human talent available to train our students* and, in the case of senior officers, assist the leadership at Goodfellow with its efforts to make continuous improvements at the schoolhouse. This is precisely why we must broaden and deepen the pool of subject-matter experts, senior intelligence officers, and senior operational leaders who come to share their expertise and life experiences with the students.

Fifth, *we must bend all our efforts to creating a proper balance between preparing to fight current adversaries and preparing students to fight future ones.* This process is under way, with the capstone intelligence exercise now featuring a high-intensity conflict and a simultaneous lower-intensity effort. This kind of play will force students to employ scarce ISR assets with maximum effectiveness and efficiency while exposing them to the full range of real and potential adversaries. Our list of those adversaries changes quickly; we must be sufficiently flexible

and well trained to wage future wars with appropriate intelligence capabilities.

The central importance of intelligence to military operations is clear. By combining a visionary and highly effective program for intelligence training with operational fixes such as a renewed intellectual infrastructure, including close cooperation between military and civilian intelligence organizations, we will be better prepared than ever for the full spectrum of armed conflict. When merged seamlessly with operations, intelligence will enable us to provide for our nation's security by delivering the decisive edge in current and future wars. ❑

Notes

1. This includes intelligence and operations personnel at Multi-National Corps-Iraq/J2, the combined air operations center, Air Combat Command/A2, and other locations.

2. The *Gulf War Air Power Survey* was the first publication to look in detail at the difficulties inherent in striking time-sensitive targets. Since then, scores of books and articles have explored this problem, and intelligence personnel are leveraging these insights along with new technologies to engage such targets in record time. See Eliot A. Cohen and Thomas A. Keaney, *Gulf War Air Power Survey* (Washington, DC: Department of the Air Force, 1993).

3. There are dozens of good sources on the project to decipher German messages, known as Ultra. One of the best is F. H. Hinsley et al., *British Intelligence in the Second World War: Its Influence on Strategy and Operations*, 5 vols. (London: Her Majesty's Stationery Office, 1979–1990). For the successes in the Pacific, see Edward J. Drea, *MacArthur's Ultra: Codebreaking and the War against Japan, 1942–1945* (Lawrence: University Press of Kansas, 1991).

4. For a detailed look at this key intelligence success, see Robert S. Ehlers Jr., "BDA: Anglo-American Air Intelligence, Bomb Damage Assessment, and the Bombing Campaigns against Germany, 1914–1945" (PhD diss., Ohio State University, 2005).

5. Ibid., 409–11.

6. Ibid., chaps. 6–8, 13.

7. Gen T. Michael Moseley, "CSAF's Vector: Transforming Air Force Intelligence, Surveillance, and Reconnaissance," 29 January 2007, http://www.af.mil/library/viewpoints/csaf.asp?id=299.

8. Ibid.

9. Ibid.

10. 17th Training Group / Training Squadron, *Modeling and Simulation Initial Operational Capability and Full Operational Capability*, August 2006; and idem, *Modeling and Simulation Strategic Plan*, September 2006.

11. Ibid.

12. The term *SIGINTer* is slang for a SIGINT specialist. These intelligence personnel are charged with monitoring both communications and noncommunications electronic emissions and bringing intelligence gleaned from these intercepts to bear during combat operations.

13. 316th Training Squadron/XP course documents.

14. Commander, 17th Training Group, memorandum of agreement among the 17th Training Support Squadron, 315th Training Squadron, and 316th Training Squadron, subject: Operation Lone Star, December 2006.

15. Quoted in "Air Force Launches Intelligence Overhaul, Aiming to Lead Field," *InsideDefense.com*, 31 January 2007, 4.

16. Message, Air Force Personnel Center, to Air Force senior intelligence officers, subject: Results of Summer 2007 Intelligence Director of Operations Board, February 2007.

17. Moseley, "CSAF's Vector."

18. The 315th Training Squadron hosted over 50 senior visitors in 2007, including 10 general officers or civilian equivalents and over 30 colonels and civilian equivalents.

19. Every training squadron includes at least 10 percent civilians—in several cases, closer to 30 percent—as well as three to 15 Guard and Reserve personnel. Finally, nearly 25 percent of the instructors in the 17th Training Group's squadrons come from our sister services.

20. 17th Training Group/TSO (Registrar) records.

21. Five recent visits by National Security Agency personnel have had a huge impact on its growing relationship with the schoolhouse.

The ABCs of Strong Leadership

Col Brad Ashley, USAF*

Leadership is unlocking people's potential to become better.
—Senator Bill Bradley (D-NJ)

TODAY'S AIR FORCE needs strong leadership at all levels and role models to serve as great examples for our Airmen. They help all of us become better. Authors have written much on the subject of leadership over the years; it remains a complex, multifaceted art with countless attributes. Strong leaders affect the attitudes of their people, prioritize the organizational "big rocks" to provide focus and direction, and display courage while making tough decisions.

"A"—Affect Attitudes

Strong leaders affect attitudes. Attitude is everything—there is nothing more powerful than a "Hooah! Can do!" attitude. The Air Force can teach an individual technical skills and a job, but it cannot teach attitude. Individuals make that decision and bring their attitudes to the work center each and every day. Our attitudes can become a powerful force multiplier that affects our productivity, safety, effectiveness, and view of our profession. Leaders' attitudes can have a powerful effect, not only on themselves but also on the entire organization. Indeed, all organizations reflect the attitude of their leadership. Therefore, it is important to remember that leaders are responsible for setting the tone—for affecting the attitudes of their people.

I still remember Staff Sergeant Allen, my basic-military-training instructor from Lackland AFB, Texas. Boy, could that man affect attitudes! He always looked like a recruiting poster: crisp and sharp, the embodiment of Air Force professionalism. He was famous for saying, "I can't make you do it, but I can make you wish you had!" I guarantee that he affected the attitudes of his Airmen each and every day. Strong leaders affect our attitudes even when they are no longer around. Our Air Force has built its rich heritage on decades of strong leaders and their wonderful examples.

Strong leaders also go out of their way to "walk the talk." Once, walking out of a headquarters entryway, I observed several Airmen standing around watching the snow fall, apparently waiting for civil engineering to clear the sidewalk to the parking lot. Several snow shovels stood idle in the corner of the foyer. Without saying a word, I grabbed a shovel, went outside, and began to enjoy shoveling the walkway. Soon the other Airmen (enlisted, civilians, and officers) grabbed shovels and joined in the festivities. We had a good time working together in the falling snow, chatting as we cleared the sidewalk and making our area safer. Strong leaders affect attitudes with their words, their examples, and—most importantly—their actions.

"B"—Big Rocks

Strong leaders focus on the big rocks. If everything is important, then nothing is important. If every task is a crisis and every project has equal importance, then nothing is really important. Leadership effectively balances our many mission requirements with scarce resources (funds, personnel, tools, time, and floor space) and makes tough decisions about our priorities. We must decide on our top issues and work them first.

---

*The author is director of communications and chief information officer at Headquarters Air Mobility Command, Scott AFB, Illinois.

Steven Covey, famous author of books on management and leadership, describes a concept he calls the big rocks.[1] In his demonstration, he uses a glass container, separate piles of big and small rocks, sand, and a glass of water. He asks participants to fill the container with all the materials. Needless to say, the task seems impossible. After the participants have repeatedly failed to fit all the materials into the container, Covey explains the proper method: all the materials will not fit unless the big rocks go in first. The small rocks fill in the gaps between the big ones; the sand and water do the same. His demonstration illustrates that we must first put our own organizational big rocks on our calendars and in our organizational job jars. Otherwise, they may not fit or get done. Strong leaders take time to reflect, select their organizational big rocks, and then communicate them as priorities to the entire team. Lesser priorities will fit in around the big ones.

Strong leaders also make conscious decisions when they select their big rocks: family time, fitness, mission, and so forth. Because time is a precious commodity to a leader, he or she must cherish and safeguard it. Airmen should always remember that if they can't be on time, they should be early!

I recently spent an hour traveling across base to present one of my vice-commander's coins for excellence. On my way back to the office, someone asked me how I find the time for these individual recognitions. My response was simple: "Recognizing and taking care of our Airmen are one of my personal big rocks, so I put these activities on the schedule first and make sure they don't get bumped by lesser priorities." I do not "fit them in" around other hectic daily activities; rather, my more routine daily activities should fit in around the big rock of recognition. Airmen should identify their own big rocks and determine why they consider them important.

"C"—Courage

Strong leaders display courage. I don't just mean courage during combat; I am talking about the daily courage to do the right thing—moral courage. Some say that moral courage involves standing up for what a person believes in or knows is right. Others say it requires telling the truth in spite of the consequences. Still others declare that moral courage entails doing what's right in the face of adversity instead of turning the other way—the easier choice. One of our Air Force core values, "integrity first," provides the foundation for building strong leadership and moral courage.

Every leader in today's Air Force should strive to achieve this admirable character trait: to stand up for what is right! As leaders, we must establish a standard of fairness and create a work environment of trust and integrity. Our people deserve nothing less. Mark Twain once observed, "It is curious that physical courage should be so common in the world and moral courage so rare."[2]

Every day we're faced with hundreds of decisions. Our decision-making process shows those around us the quality of our character. True tests of character come when the stakes are high—when we know that we must make our decision even though it will not be popular. When we do that, we reveal our true character.

Some of our toughest leadership decisions concern people and disciplinary cases, all of which, of course, involve at least two sides. Leaders review the facts of the case, consider inputs from supervisors and commanders, and receive advice from the judge advocate general. Ultimately, however, the commander must weigh all the facts and make the tough decision. Strong leaders carefully consider all the facts, lean on their moral courage, and make the right decisions. At one time, I faced the tough decision to remove a key subordinate from his Air Force leadership position because of unethical behavior. A respected Airman, he had been a good friend for over 10 years, so, personally, making the decision proved difficult. But it was easy in the context of the corporate Air Force, which, along with the base, squadron, and all its fine Airmen, benefited by the removal. I never regretted that decision and am still thankful I had the moral courage to make it.

The job we do is important, not only to our-selves and our families but also to our nation. The men and women serving on our front lines depend on us for their lives. The dedica-tion, skill, and moral courage of our Airmen will help us fulfill the Air Force's top priority of winning the global war on terror. It will pro-tect the lives of our war fighters and preserve freedom for the next generation.

Our Airman's Creed closes with the decla-ration *"I am an American Airman: wingman, leader, warrior. I will never leave an Airman be-hind, I will never falter, and I will not fail."* Strong leadership is critical to the success of our Air Force mission. Therefore, by properly affect-ing attitudes, helping our organizations focus on the important "big rocks," and displaying moral courage, we can help our great service make everyone into better, stronger leaders. By applying these virtues to our daily missions, we will never falter—and we will not fail. Hooah!! ❑

Notes

1. Steven R. Covey, A. Roger Merrill, and Rebecca R. Merrill, *First Things First: To Live, to Love, to Learn, to Leave a Legacy* (New York: Simon and Schuster, 1996), 88–89.

2. Mark Twain, "Purchasing Civic Virtue," in *The Por-table Mark Twain*, ed. Bernard DeVoto (New York: Viking Press, 1946), 571.

Cleared to Engage

Improving the Effectiveness of Joint Close Air Support

Maj Michael H. Johnson, USMC*

Editorial Abstract: The importance of close air support (CAS) is greater now than in any of our most recent conflicts, dating back to Operation Desert Storm. Since the joint aspects of CAS are also magnified more than ever, crucial issues and deficiencies with joint doctrine and training highlight a glaring need for improvements in both arenas. The author proposes numerous, specific ideas for addressing these shortfalls for all services involved in joint CAS operations.

THE TERM *CLOSE air support* (CAS) evokes scenes from the movie *Platoon*, in which a ground commander exhorts aircraft to "drop all remaining on my pos[ition]" to avoid being overrun by enemy forces. The mission has evolved into much more. Arguably the most difficult mission flown by aircraft on today's battlefield, CAS has remained at the heart of airpower debates for decades.[1] It requires the highest level of integration with ground forces, indirect fires, and other assets; furthermore, in most cases,

CAS demands the greatest precision due to the proximity of friendly forces.[2] Finally, it has the highest potential for negative ramifications if something goes wrong, such as fratricide, civilian deaths, or the overrunning of ground forces.

The global war on terror has elevated the importance of CAS. Ground forces increasingly rely on the effects that airpower provides. The percentage of missions classified as CAS was small during Operation Desert Storm (6 percent) and Operation Allied Force (0) (because of the absence of terminal attack controllers on the ground in Kosovo).[3] In Operations Enduring Freedom and Iraqi Freedom, this percentage increased drastically. During Operation Anaconda, nearly all such missions supported ground forces in the Shah-e-Kot Valley.[4] During the push to Baghdad in 2003, 75 percent of Navy and Marine air involvement consisted of CAS missions.[5] According to the US Central Command Air Forces report entitled *Operation Iraqi Freedom—By the Numbers*, 79 percent of targets struck during the campaign fell under the kill-box interdiction/CAS category.[6] In current Iraqi Freedom operations, almost all air missions require positive control to engage ground targets.

Recent combat operations have become increasingly joint in nature—for example, Air Force F-16 multirole fighters and Army AH-64 Apache helicopters provide CAS for Marine battalions, Marine AH-1 Cobra helicopters support Army brigades, and Navy F/A-18 multirole fighters support special forces. This increased joint interaction, coupled with service differences in the approach to doctrine and training, has decreased the effectiveness of CAS.

Joint Publication (JP) 3-09.3, *Joint Tactics, Techniques, and Procedures for Close Air Support*, lists eight conditions for effective CAS: (1) effective training and proficiency, (2) planning and integration, (3) command, control, and communications, (4) air superiority, (5) target marking and acquisition, (6) streamlined and flexible procedures, (7) appropriate ordnance, and (8) favorable weather.[7] Doctrine and training affect all of these except air superiority and favorable weather. This article ad-

dresses ways to improve CAS effectiveness by focusing on doctrine and training.

Close Air Support Doctrine

CAS has its roots in the early decades of the twentieth century. The advent of the airplane quickly led to its application in strafing and bombing on the battlefields of Europe in World War I. Marine aviators developed an early form of CAS in the Nicaraguan civil war of 1927.[8] Principles guiding these early uses of airpower in support of ground troops gradually matured through World War II, the Korean War, and Vietnam War into the doctrine we have today.

Service viewpoints on CAS diverged after World War II. Many Air Force proponents considered strategic bombing the primary role of airpower and viewed CAS as "a maximum waste of firepower."[9] The Army looked at airpower in terms of supporting a ground campaign. These perspectives continue within the two services in some form to the present day.

The underlying tension regarding the differing viewpoints on CAS affected interservice relationships and aircraft procurement throughout the 1960s. The Johnson-McConnell agreement of 1966 further delineated the Air Force's role as the sole provider of fixed-wing CAS to the Army while recognizing that Army helicopter missions included fire support.[10] Subsequently, in 1975 a letter outlined the Air Force's and Army's understanding of the use of airpower, shaping the latter's doctrinal stance on CAS.[11] Army leaders first used the term *direct aerial fire support* to describe helicopter CAS and attached a definition that would not antagonize the Air Force: "fire delivered by aerial vehicles organic to ground forces against surface targets and in support of land operations."[12] This evolved into "close in fire support" and, currently, "close combat attack."[13]

Viewing CAS through a much different lens, the Marine Corps approaches warfare by stressing combined-arms fires and aviation fires as integral parts of the overall plan. In 1935 the Corps established aviation as an independent section "primarily for the support

of Fleet Marine Forces in landing operations and in support of troop activities in the field."[14] The Marine Air Ground Task Force construct includes an aviation element to provide fire support. This air-ground approach endured due to the use of a historically lighter force, with aviation fires providing the required support. Additionally, Marine aviation historically has focused on the tactical level. Having no strategic bombers, the Marine Corps has avoided the debate within the Air Force on the most efficient application of airpower. However, this contributes to problems with joint integration as Marine leadership constantly wrestles over the right mix of providing aircraft for a joint air campaign while maintaining the direct-support capability of Marine aviation.

JP 3-09.3 governs CAS procedures. Many current CAS debates deal with different services' approaches to CAS and their understanding of the doctrine. Service parochialism also significantly motivates the differing viewpoints. The argument of whether or not CAS constitutes an effective use of airpower lies beyond the scope of this article. The underlying debate, however, drives the Army's and Air Force's mind-set and each service's approach to the mission.

Helicopter development provided Army ground commanders with an organic air platform to deliver fire support.[15] The Army viewed this as critical due to its perception of a lack of support from the Air Force, whose focus remained on strategic bombing. This development, unfortunately, also involved the use of semantics and wordsmithing to avoid "encroaching" on the Air Force's responsibility of providing CAS to the Army. Over the years, this tit for tat resulted in an almost superstitious avoidance of using the term within Army circles or implying that Army aviation performed the mission. A letter from the Army and Air Force chiefs of staff to the chairman of the House Armed Services Committee in September 1975 defined the role of the attack helicopter as "integral to the Army ground maneuver unit and an extension of organic firepower." The two services agreed that "the attack helicopter does not perform CAS but is intended to complement Air Force CAS capa-

bilities."[16] Army helicopters do conduct CAS but under the guise of calling it something else. Army Field Manual (FM) 3-04.111, *Aviation Brigades*, defines close combat attack (CCA) as "a hasty or deliberate attack in support of units engaged in close combat. During CCA, armed helicopters engage enemy units with direct fires that impact near friendly forces. . . . CCA is coordinated and directed by a team, platoon, or company-level ground unit using standardized CCA procedures in unit [standard operating procedures]."[17]

Compare the CCA definition with the current joint definition of CAS: "air action by fixed- and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces."[18] CCA even goes so far as utilizing the joint CAS nine-line briefing format but calling it the "close combat attack briefing."[19]

Prior to Enduring Freedom and Iraqi Freedom, Army helicopter units generally supported only Army ground units; thus, this doctrinal approach did not influence joint operations. Since the terrorist attacks of 11 September 2001 (9/11), however, Army attack helicopters have provided fire support for special forces and Marine ground units. The Army encountered problems since its pilots were not well versed in CAS procedures.[20] Based on this doctrinal issue, the service made adjustments to procedures for command and control (C2) and forward air control (FAC) when AH-64s supported Marine units.[21]

Within the Air Force, one finds a persistent perception that CAS is a lower-priority mission or a less effective use of airpower than interdiction or strategic bombardment.[22] Current Air Force doctrine perpetuates this perception: "CAS applications must be weighed against other, potentially more effective, uses for CAS-capable assets such as [air interdiction] or even strategic attack."[23] This approach inhibits effectiveness since units spend less time training for CAS. Historically, this did not present a major problem because A-10 aircraft provided the preponderance of CAS sorties and because their pilots were generally

well versed in CAS procedures. Technology and an increase in CAS taskings have changed this drastically during Enduring Freedom and Iraqi Freedom. Advances in weapons and sensors now enable many different aircraft to perform the CAS mission, including B-52 and B-1 bombers. This shift to CAS support from other aircraft can result in the mission's utilization of aircrew members with little or no understanding of the ground scheme of maneuver or the intricacies of an integrated fire-support plan. In these situations, one commonly sees the "bomb on coordinate" mentality; that is, the aircrew focuses on target coordinates for delivery of a precision-guided munition (PGM), missing the importance of an assigned final-attack heading or a time on target—both critical pieces to the ground unit or controller.[24]

One must also consider doctrinal differences concerning fire support coordination measures. Discussion of fire support coordination line (FSCL) emplacement lies outside the scope of this article; however, it does affect the effectiveness of CAS. Nowhere does the joint CAS publication state that CAS is tied to a specific fire support coordination measure. In fact, it says that the FSCL "does not divide an area of operations by defining a boundary between close and deep areas or create a zone for CAS."[25] Misunderstanding of this basic premise places undue restrictions on aviation fires and unnecessarily requires CAS control for missions meeting the definition of interdiction. Understanding what CAS is and is not still varies within the branches.[26] For example, briefings given at the Joint Close Air Support (JCAS) Conference of 2004 described Scud missile-hunting missions in the western desert of Iraq during Iraqi Freedom as CAS.[27] Confusion over the difference among CAS, interdiction, and terminal guidance operations has also led to recommendations to call operations something else, such as battlefield air interdiction or ground-aided precision strike.[28]

Current CAS doctrine also falls short by focusing almost exclusively on fixed-wing tactics, techniques, and procedures (TTP). A total of six pages in the current joint CAS publication covers rotary-wing CAS employment, control points, tactics, and weapons. One can attri-

bute this imbalance, in part, to the fact that the Army does not conduct CAS or FAC (airborne) (FAC[A]) missions. However, Marine attack helicopters routinely execute them. During Anaconda, Marine AH-1 Cobra helicopters did not perform FAC(A) or strike coordination and reconnaissance due to a lack of understanding within the joint task force's chain of command concerning their capabilities.[29] One cannot blame this problem on the Army commanders, whose exposure to rotary-wing attack aviation in most cases was limited to AH-64s, which do not routinely perform those missions. Such a lack of knowledge regarding helicopter capabilities leads to inefficient employment of these assets.[30] The problem also affects training since service FAC(A)s (except those in the Marine Corps) rarely control helicopters during FAC(A) training.[31]

Moreover, technology has a dramatic effect on doctrine, which cannot keep pace with advancements. More frequent use of PGMs affects the execution of CAS missions. The increased standoff and delivery ranges of PGMs require that ground commanders have a higher level of confidence in both their air controller and the CAS platform.

Video feeds such as those from the remotely operated video-enhanced receiver allow joint terminal attack controllers (JTAC) to use unmanned aerial vehicles (UAV) and aircraft sensors to aid in targeting.[32] JTACs no longer must see the target with their eyes in order to engage it, and in many cases, they may be several kilometers from the target. Unfortunately, this situation can lead to micromanagement of tactical attacks because commanders now have a bird's-eye view of an engagement and feel the need to step in rather than let the tactical operators execute the mission.[33] The fact that UAV usage also outpaces the ability to define doctrine and TTPs for CAS missions has many ramifications for CAS, including clearance of fires, UAV control authority, airspace deconfliction, and target handoff.

Many of these doctrinal problems affect training as well. CAS training varies from service to service and conflict to conflict. Standardization has improved for terminal attack

controllers, but many areas in the training of CAS aircrews still need improvement.

Close Air Support Training

All members of the military have heard the oft-repeated expression "train like you fight, and fight like you train." Nowhere is this more important than in CAS. Nevertheless, aircrews and controllers often improvise during execution due to a lack of practice or training in CAS procedures. Recent years have seen the incorporation of several standardization initiatives, but most of them focus on terminal controllers. Unfortunately, because aircrew standardization varies among services and units, we still have hurdles to negotiate in CAS training before effectiveness improves.

The first obstacle involves a paucity of joint training, highlighted by the General Accounting Office's report of 2003 on military readiness as one of four main areas for improvement.[34] Recent initiatives such as the Joint National Training Capability by Joint Forces Command (JFCOM) are attempting to address the problem.[35] Although such efforts represent a good first step, service-specific taskings and a lack of central oversight and authority remain problems. Training requirements as well as high operational tempo often force units to forgo joint training in lieu of higher-priority service taskings. Additionally, even though JFCOM facilitates joint training and can provide funding incentives for exercises, it holds no authority to compel units to participate. This problem occurs even within the Marine Corps, which generally performs air-ground integration well. The fact that Marine ground units tend to train with Marine aircraft because they are familiar with each other inhibits controllers and aircrews from becoming more knowledgeable about joint air assets.[36]

The failure of some units to emphasize CAS training raises another hurdle. Instead, they concentrate on other missions, such as air-to-air engagements or interdiction, despite their low probability of occurrence—especially in current Iraqi operations.[37] True, units must maintain proficiency and competency in all taskings and missions, but they should not neglect training in one of the most likely areas of employment in-theater.

The fluidity of operations also contributes to training issues. During the Iraqi ground campaign in 2003, the diverting of many sorties after they became airborne to provide CAS precluded effective pre-mission planning and integration.[38] It also perpetuated the notion of CAS as a pickup mission that we can execute on the fly and that consequently requires little emphasis during training.

Other external requirements also affect training. Army restructuring places greater demands on the Air Force for terminal attack controllers and calls for more training sorties with the same amount of aviation support.[39] The Marines face a similar situation with the stand-up of the single-seat FAC(A) program within fixed-wing units.[40]

Furthermore, technology can inhibit CAS training. In many cases, CAS aircrews and controllers develop ad hoc TTPs. Failure to capture TTPs at a central point for dissemination leads to varying degrees of proficiency and different procedures amongst units. In some cases, shortages of systems such as advanced targeting pods limit aircrew training prior to deployment, leading to less effective application in-theater.[41]

The doctrine and training issues outlined above do not usually prevent forces from receiving CAS. The world leader in applying military power, the United States concedes nothing in the conduct of that mission; regardless, implementation of the following recommendations will increase effectiveness across all services and make CAS truly joint.

Doctrinal Recommendations

The following recommendations focus on first correcting deficiencies in CAS doctrine. In some cases, they require a dramatic shift by services in their approach to CAS. This is necessary, however, to facilitate subsequent improvements in CAS training.

Encourage Air Force and Army Headquarters to Acknowledge That Army Attack Aviation Performs CAS

Airpower employment continues to evolve long after the two services agreed that attack helicopters "do not perform CAS."[42] To perpetuate such a myopic view is reprehensible. Both services agree that the Army relies on external support for fixed-wing CAS, the preponderance of which comes from the Air Force, based on historical precedent and agreements. The attack helicopter is a viable CAS platform, as demonstrated for over 35 years by the Marine Corps and by the Army in recent operations in Enduring Freedom and Iraqi Freedom. This fact does not threaten either service's mission sets or support. Army attack aviation can still perform as maneuver elements and conduct other required missions. This proposal merely formalizes what already occurs. Acknowledgement that the Army does CAS is crucial since Army aviation actively provides CAS to Army, Marine, and special forces units in Enduring Freedom and Iraqi Freedom; hence, pilots need training to become familiar with CAS procedures. A Casey-Moseley agreement similar to Johnson-McConnell or the one between Gen David C. Jones, Air Force chief of staff, and Gen Frederick C. Weyand, Army chief of staff, in 1975 would reaffirm the Air Force's commitment to providing fixed-wing CAS for the Army while acknowledging the latter's attack-aviation role in CAS and FAC(A).[43]

Stand Up an Army FAC(A) Program

An Army rotary-wing FAC(A) program offers many advantages. Trained to operate under standardized procedures outlined in the Joint FAC(A) Memorandum of Agreement, FAC(A)s provide Army commanders increased capability to control aerial fires. In some cases, this capability could ease the requirement for additional JTACs as units restructure under the brigade concept. Army attack aviation has practiced many FAC(A) functions for years under the joint air attack team concept.[44] In Vietnam, controllers routinely flew in Army helicopters. More recently in Iraq, terminal attack controllers flew in the right seat of OH-

58 scout helicopters of the 101st Airborne Division.[45] Marine AH-1 Cobra and UH-1 Huey helicopters already function as rotary-wing FAC(A)s.

Proof of concept training for this idea occurred in January 2006, when four US Army AH-64D Apache pilots from the 1st Battalion, 227th Attack Regiment received FAC(A) academic training, spending two weeks flying rotary-wing FAC(A) missions with Marine Aviation Weapons and Tactics Squadron 1 (MAWTS-1), which provides tactical standardization and advanced-level training for all Marine Corps aviators. AH-1W FAC(A) instructors flew in AH-64D aircraft, offering live-fire FAC(A) instruction. The proof of concept affirmed the AH-64 as a viable and capable platform for FAC(A) and showed that senior Army attack pilots could proficiently conduct FAC(A) following the training.[46] Although we must address support issues to stand up a FAC(A) program, we should base our decision on honest analysis of the increased capability that it would provide—not on traditional missions within the services.

Many requirements are already in place to implement the program. The Joint FAC(A) Memorandum of Agreement outlines certification standards and requirements. We could quickly incorporate rotary-wing FAC(A) TTPs already established and used by Marine helicopters into Army doctrine and publications.[47] Furthermore, by leveraging MAWTS-1 FAC(A) instructors under a "train the trainer" concept to stand up an initial cadre of Army FAC(A) instructors, we could conduct initial training of Army pilots.

Encourage the Services to Place Greater Emphasis on the Close Air Support Mission

Emphasis on the CAS mission has improved since 9/11; however, the advent of advanced sensors and PGMs thrust many platforms into the CAS role without a solid understanding of or exposure to CAS doctrine. Units that have recently begun employing their platforms in the CAS role are most affected. Increased doctrinal emphasis on the mission by service headquarters will expand unit awareness of

CAS doctrine and TTPs, thereby increasing standardization and effectiveness.[48]

Change the Services' Doctrinal Approach to Fire Support Coordination and Close Air Support

Such change requires education and discussion of CAS employment procedures and doctrine within each service's C2 structure. Personnel manning the battlefield coordination detachment, air support operations center, or direct air support center must thoroughly understand what CAS is and is not, as well as how management of fire support coordination measures and fires critically affects CAS. Education and discussion must include ground commanders at all echelons. Their understanding of CAS employment principles also drives the effectiveness of air-delivered fires.[49]

Expand Detail in Close Air Support Doctrine on Helicopter Tactics, Techniques, and Procedures

Expansion of Army attack aviation into CAS and FAC(A) roles will increase the utilization of rotary-wing CAS. Knowledge of helicopter CAS TTPs varies greatly within fixed-wing units and the services. Marine fixed-wing pilots generally know the most about helicopters due to habitual unit relationships within the Marine Air Ground Task Force construct. We must make a concerted effort to incorporate more information and TTPs regarding helicopter operations into doctrine.

Promote Better Understanding of Close Air Support Control Types and FAC(A) Utilization by Ground Commanders

Continued education and inclusion of ground commanders in JCAS will greatly improve that process. Offering a CAS "primer" as part of the services' commanders' courses would better familiarize incoming commanders with JCAS and FAC(A) TTPs.[50] Increased integration of ground officers into forums such as the JCAS and Joint FAC(A) conferences would also prove beneficial since their participation at these two conferences is usually limited. Most participants come from aviation or terminal controller backgrounds.

Update Close Air Support Tactics, Techniques, and Procedures to Reflect Current Technology

Finally, CAS doctrine must catch up to technology. We must filter and codify the combat expertise of CAS aircrew members and controllers into JCAS doctrine. Moreover, we must implement a detailed expansion of TTPs on PGM targeting and delivery, usage of video feeds, and UAV integration. Additionally, we must discuss the UAV role in CAS, possibly including joint fires observer and/or FAC(A) training for UAV operators. Incorporation of the latest information into JP 3-09.3 will ensure that a baseline level of knowledge reaches all controllers and aircrews rather than remaining at a unit or service level.

Training Recommendations

Commanders and units must constantly emphasize training that routinely exercises CAS tactics, techniques, and procedures. Successful CAS training will result in safe and effective CAS employment.

—Marine Corps Warfighting Publication 3-23.1, *Close Air Support*, 8 September 2007

Doctrinal changes will have little effect unless they are accompanied by improvements in training. Joint training does occur to varying degrees, but on an ad hoc basis and often through the buddy system via telephone conversations or e-mail between squadrons. Although this may succeed in meeting the squadron's training requirements, it is an informal method, and neither squadron receives credit for joint training.

Establish a Joint Training Requirement

Deciding to levy an additional requirement on units would not sit well with them due to current operations tempo and deployment cycles, but it would increase joint interaction between units. We should take a commonsense approach to minimize the impact on overburdened units—for example, aligning units to joint-training opportunities reasonably near their home stations. We should also consider joint-tasking requirements a key factor in de-

termining unit participation. Moreover, this training should count towards service-specific predeployment training requirements.

This recommendation requires expansion of the Integrated Training Initiative sponsored by the Air Force, which does include joint-training opportunities.[51] We need to increase participation from the other services, however, to offset the initiative's focus on Air Force units. Expansion of the initiative to include alignment of units to joint exercises, based on mission requirements and deployment cycles, would enhance the effectiveness of units conducting JCAS operations. It would also meet the increased requirements for training CAS controllers and FAC(A) aircrew members. Aligning units based on training requirements allows a more efficient use of aviation assets during training.

Increase Joint Interaction among the Services' Weapons Schools

Joint interaction at the services' weapons schools has improved in recent years, but participation is often limited to high-demand/low-density platforms such as the Airborne Warning and Control System, Joint Surveillance Target Attack Radar System, or EA-6B Prowler. We should increase participation by JCAS aircraft and should include conferences on tactics and lessons learned. Granted, the JCAS and joint FAC(A) conferences represent excellent forums for discussing TTPs and lessons learned, but, ideally, we should strive for greater interaction at tactical forums such as the Air Force Weapons and Tactics Conference.[52] Platforms from all services would benefit from many CAS/FAC(A) lessons learned and TTPs at such a conference.

Services also benefit from the cross training of CAS and FAC(A) subject-matter experts. Familiarization flights with another service's CAS or FAC(A) platforms would work to everyone's advantage.[53] Such joint interaction enables greater understanding of the employment TTPs of different platforms, sensors, and weapons, which leads to more efficient execution the next time the two platforms or units work together.

Establish a Close Air Support Mission-Essential Task List for All Aircraft Performing the Mission

This task list should mirror those lists established for JTAC and Joint FAC(A) training.[54] Such a list would increase the effectiveness of CAS assets by outlining expectations of the platforms. The JTAC and Joint FAC(A) memorandums of agreement outline much of this standardization. Service and platform CAS experts can modify those existing standards to define aircraft-specific requirements, including those of UAVs. Leveraging CAS syllabi from similar fixed- and rotary-wing platforms will provide information for units expanding or creating a CAS training syllabus.

Elevate the Importance of Close Air Support Training in the Air Force

In the past, concerns arose regarding whether aircraft had the capability to perform the CAS mission. Targeting pods and precision weapons now allow many different aircraft to acquire and engage targets in support of this mission, but CAS training has not advanced with these capabilities. Until we assign CAS training the same importance as air interdiction or strategic attack, units will view it as a secondary mission and attach less significance to it.[55] Many platforms have missions that focus on areas beyond CAS, but we need some baseline of standardized training if we want them to perform effectively in the CAS role.

Incorporate Close Air Support Training into Syllabi for Training in Army Attack Aviation

An increase in training must accompany acceptance of CAS as a rotary-wing mission. Training syllabi for Army AH-64 Apache and OH-58 Kiowa pilots should incorporate CAS academics and flight training. Stand-up of a FAC(A) program also requires more training. Marine AH-1W and UH-1N syllabi can undergo review with an eye towards developing a satisfactory syllabus to sufficiently prepare Apache and Kiowa pilots in CAS and FAC(A) TTPs.[56]

Create an Army Weapons School

Currently, Army aviation standardization resides at Fort Rucker, Alabama, with the Directorate of Evaluation and Standardization, while the Directorate of Training and Doctrine handles doctrinal literature and standardization of tactical operations.[57] The Army has no weapons-and-tactics course that confers advanced training on pilots. These "patch wearers" in the other services are considered the subject-matter experts on weapons and tactics for their respective platforms.[58] The Army has a wealth of knowledge and experience in its aviation corps, but the absence of a weapons school prevents the service from effectively harnessing and institutionalizing this knowledge.

The proposed Army Aviation Weapons and Tactics Squadron (AAWTS) could pattern itself after a construct similar to that of MAWTS-1, the Marine Corps weapons school. The Directorate of Evaluation and Standardization would handle flight standardization and training for units and pilots, while the AAWTS would assume responsibility for tactical standardization and advanced-level training. This would encompass functions similar to those of MAWTS-1, including advanced training such as FAC(A), production of tactical publications, doctrine input, and test and evaluation of emerging technology or procedures.

The Army's Yuma Proving Ground complex in Arizona would serve as an ideal location for the AAWTS. It provides access to several aviation-training ranges and is centrally located, near the Air Force's Fighter Weapons School at Nellis AFB in Las Vegas, Nevada; Luke AFB in Phoenix, Arizona; the Marine Corps Air Ground Combat Center in Twenty-Nine Palms, California; and MAWTS-1 in Yuma, Arizona. This location promotes synergy by increasing joint interaction for all services. The AAWTS instructor courses would allow access to Army helicopters and aircrew members for joint training during Marine Weapons and Tactics Instructor courses or Air Force Weapons School courses. The benefits of standing up an AAWTS reach beyond Army aviation and would positively affect all services.

Conclusions

Close air support is good for your morale; it's really, really bad for the enemy's. I think the confidence of the 0311 [rifleman] that's behind the mortar hole, with RPGs [rocket-propelled grenades] [bouncing] off sandbags—I think it's good for him when a five hundred pound bomb drops in the vicinity of where he was just taking fire. It's certainly good at the company level, and it's certainly good at the battalion level, as in, "We're in control here; we can take this over at any time we want to." HUMINT [human intelligence] reports [showed that] it was devastating, absolutely devastating to them.

—Interview with FACs of the 22nd Marine Expeditionary Unit, 5 June 2004

Most of the issues outlined in this article are not new. A review of CAS literature over the last 30 years reveals many recurring topics. The question then becomes, what is the impetus for resolving these matters? The answer lies in the conflict we face in the global war on terror and the realities of limited resources. To become more effective, the services must embrace the reality of JCAS.

Approaching CAS from a systems standpoint, we have made improvements in many areas. Technology allows us to utilize air assets in the CAS role in ways we could not have imagined 20 years ago. Standardization of terminal attack controllers and updates to doctrine have enabled us to apply those technologies more effectively during missions. The last areas that we must address involve the aircrew members and units that perform the mission. Applying the outlined doctrine and training recommendations completes that step. Ideally, a day will come when support to the JTAC will be uniform, regardless of the platform or service providing it. ❏

Notes

1. Lt Col James D. Reed, "Army's Transformation Impact on Close Air Support Terminal Attack Control," Strategy Research Project (Carlisle Barracks, PA: US Army War College, 2006), 8. Reed states that the joint terminal attack controller's mission "is highly demanding and often complex." Ibid.

2. David A. Deptula and Sigfred J. Dahl, "Transforming Joint Air-Ground Operations for 21st Century Battlespace," *Field Artillery*, July–August 2003, 4. Deptula and Dahl note that "it takes advanced situational awareness and weapons systems knowledge to both 'rack-and-stack' multiple flights of attack aircraft and choose the correct delivery system and ordnance for desired effects." Ibid.

3. Rebecca Grant, "The Clash about CAS," *Air Force Magazine* 86, no. 1 (January 2003): 56 ("Stretching the Definition"), http://www.afa.org/magazine/jan2003/0103cas.pdf.

4. Ibid.

5. Arthur P. Brill Jr., "Close Air Support: More Improvement Is Needed," *Sea Power*, November 2003, 1, http://findarticles.com/p/articles/mi_qa3738/is_200311/ai_n9311629/pg_1.

6. *Operation Iraqi Freedom—By the Numbers* (Shaw AFB, SC: Assessment and Analysis Division, US Central Command Air Forces, 30 April 2003), 5, http://www.au.af.mil/au/awc/awcgate/af/oifcentaf.pdf.

7. Joint Publication (JP) 3-09.3 *Joint Tactics, Techniques, and Procedures for Close Air Support (CAS)*, 3 September 2003 (incorporating change 1, 2 September 2005), I-6, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_09_3ch1.pdf.

8. Robert L. Sherrod, *History of Marine Corps Aviation in World War II* (Washington, DC: Combat Forces Press, 1952), 25.

9. Douglas N. Campbell, *The Warthog and the Close Air Support Debate* (Annapolis, MD: Naval Institute Press, 2003), 39.

10. *The United States Air Force: Basic Documents on Roles and Missions*, comp. and ed. Richard I. Wolf (Washington, DC: Office of Air Force History, 1987), 379.

11. Ibid., 403.

12. Benjamin F. Cooling, ed., *Case Studies in the Development of Close Air Support* (Washington, DC: Office of Air Force History, 1990), 455.

13. For the former term, see Maj Rhett B. Lawing, "American Armed Forces' Service Culture Impact on Close Air Support," *Chronicles Online Journal*, 18 December 2006, http://www.airpower.maxwell.af.mil/airchronicles/cc/lawing.html.

14. Sherrod, *History of Marine Corps Aviation*, 32.

15. J. Kristopher Keener, *The Helicopter Innovation in United States Army Aviation* (Cambridge, MA: Massachusetts Institute of Technology Security Studies Program, 2001), 13, http://web.mit.edu/SSP/Publications/working_papers/wp_01-1.pdf.

16. *United States Air Force: Basic Documents*, 403.

17. Field Manual (FM) 3-04.111, *Aviation Brigades*, August 2003, Q-15, http://www.globalsecurity.org/military/library/policy/army/fm/3-04-111/fm3-04-111.pdf.

18. JP 3-09.3, *Joint Tactics, Techniques, and Procedures for Close Air Support (CAS)*, I-1.

19. FM 3-04.111, *Aviation Brigades*, Q-16.

20. Lt Col Jim Adams, operations officer, Marine Aviation Weapons and Tactics Squadron 1 (MAWTS-1), discussion with the author, March 2005. Colonel Adams served as aircraft maintenance officer for Marine Medium Helicopter Squadron 266, the Aviation Combat Element for the 22nd Marine Expeditionary Unit, which conducted combat operations in support of Enduring Freedom in the Tarin Kowt region of Afghanistan, April–July 2004. During these operations, AH-64s were tasked to support Marine Expeditionary Unit operations on several occasions.

21. Maj Michael D. Grice, "AH-64 Apache Attack Helicopters: Integrating the AH-64 into the MAGTF Battlespace," *Marine Corps Gazette* 91, no. 3 (March 2007): 27–30.

22. Lawing, "American Armed Forces' Service Culture," 3.

23. Air Force Doctrine Document (AFDD) 2-1.3, *Counterland Operations*, 11 September 2006, 34, http://www.fas.org/irp/doddir/usaf/afdd2-1-3.pdf.

24. Author's experience as a forward air controller and forward air controller (airborne) instructor at Marine Aviation Weapons and Tactics Squadron 1.

25. JP 3-09.3, *Joint Tactics, Techniques, and Procedures for Close Air Support (CAS)*, III-22.

26. Deptula and Dahl, "Transforming Joint Air-Ground Operations," 4.

27. The author's experience while attending the JCAS conference in 2004.

28. Lt Col Eric E. Theisen, *Ground-Aided Precision Strike: Heavy Bomber Activity in Operation Enduring Freedom*, Maxwell Paper no. 31 (Maxwell AFB, AL: Air University Press, 2003), 1.

29. Author's experience as flight lead during Anaconda with AH-1W detachment from HMM-166, the aviation combat element for the 13th Marine Expeditionary Unit, attached to the 10th Mountain Division, 4–26 March 2002.

30. Ibid.

31. Author's discussions with service FAC(A) representatives during the Joint FAC(A) Conference in Yuma, AZ, December 2005.

32. That system receives camera images from nearby aircraft and UAVs, integrating them with other US positioning and targeting software and thus enabling the JTAC to view the target from the aircraft-sensor perspective.

33. Excerpt from briefing, Marine Light Attack Helicopter Squadron (HMLA)-773, MAWTS-1, subject: Lessons Learned, May 2005. HMLA-773 deployed in support of Enduring Freedom from October 2003 until March 2005.

34. *Report to the Ranking Minority Members, Subcommittees on Total Force and Readiness, Committee on Armed Services, House of Representatives, Military Readiness Lingering Training and Equipment Issues Hamper Air Support of Ground Forces* (Washington, DC: General Accounting Office, 2003), 2.

35. "Joint National Training Capability (JNTC)," United States Joint Forces Command (Norfolk, VA: USJFC, 2003), http://www.jfcom.mil/about/fact_jntc.htm.

36. Author's experience while serving as AH-1W division operations officer during Weapons and Tactics Instructor courses and Desert Talon exercises at MAWTS-1, June 2004–June 2005.

37. Author's discussions with F/A-18 instructors, Marine Aviation Weapons and Tactics Squadron 1, during revisions to manual on training and readiness, 2005.

38. Michael D. Millen, "Improving Detailed Integration in Close Air Support Planning and Execution" (thesis, US Army Command and General Staff College, 2004), 50.

39. Reed, "Army's Transformation Impact," 1.

40. Previously, two-seat F/A-18D aircraft were the only fixed-wing aircraft in the Marine Corps inventory that conducted the FAC(A) mission. In 2005 the Corps added the FAC(A) mission to the single-seat AV-8B and F/A-18C manuals on training and readiness.

41. Marine Corps Center for Lessons Learned, "VMA Operations: Quick Look Report," 16 February 2007, 2, https://www.mccll.usmc.mil/document_repository/IORs/VMA%20513%20Quick%20Look%207_0.pdf. AV-8B pilots from VMA-513 expressed the need for more predeployment training on procedures for employing their targeting pods to detect potential improvised explosive devices.

42. *United States Air Force: Basic Documents*, 403.

43. The Casey-Moseley agreement is named after Gen George W. Casey Jr., the current Army chief of staff, and Gen T. Michael Moseley, the current Air Force chief of staff. See *United States Air Force: Basic Documents*, 405.

44. FM 90-21, *JAAT Multi-Service Procedures for Joint Air Attack Team Operations*, 1998. JAAT operations are defined as coordinated attacks by rotary- and fixed-wing aircraft, normally supported by artillery or naval surface fire support.

45. Bruce Pirnie et al., *Beyond Close Air Support: Forging a New Air-Ground Partnership* (Santa Monica, CA: RAND, 2005), 72, http://www.rand.org/pubs/monographs/2005/RAND_MG301.pdf.

46. Author's opinion, based on his experience as the rotary-wing FAC(A) subject-matter expert for MAWTS-1 and the performance of the pilots and aircraft in conducting the FAC(A) mission.

47. NTTP 3-22.3-AH1W, *Combat Aircraft Fundamentals, AH-1W (U)*, 2005. Chap. 11 of this tactical manual covers rotary-wing FAC(A) TTPs for Marine Corps AH-1W and UH-1N helicopters.

48. None of the Air Force–sponsored research topics for 2006–7 dealt with CAS. The list of topics from the Combined Arms Center for Army Command and General Staff College and the School for Advanced Military Studies for 2006–7 included "Air-Ground Integration in Counterinsurgency Operations."

49. L. Ross Roberts, *Ground Truth: The Implications of Joint Interdependence for Air and Ground Operations*, Occasional Paper no. 52 (Maxwell AFB, AL: Center for Strategy and Technology, Air War College, 2006), 16. Roberts notes that during the first five days of operations in Iraqi Freedom, the V Corps commander hesitated to open kill boxes short of the FSCL for fixed-wing interdiction even though there were no friendly forces in those boxes. Ibid.

50. Each service has a program designed to provide information to prospective commanders. The Marine Corps Commanders' Program provides information and a course of instruction to enhance their performance as commanders. See http://www.mcu.usmc.mil/mcu/catalog/21cdrprog.pdf.

51. United States Air Force Air Combat Command, "Integrated Training Initiative," https://totn.acc.af.mil/xoya/int_training_conf. The Integrated Training Initiative—a single-source forum for combining tactics, training, and scheduling from all weapons systems from all joint and multinational services—consists of both this scheduling Web site and a quarterly conference held the third week in the second month of the quarter. The Integrated Training Conference attains training efficiency through a "bottom-up" strategy of comparing/linking schedules from all fighter; bomber; command, control, intelligence, surveillance, and reconnaissance; combat search and rescue; tanker; distributed mission operations; air defense artillery; and other assets. In this process, areas of commonality are identified and subsequently "synchronized" into a single training event.

52. United States Air Force Air Combat Command, "Weapons and Tactics Conference," http://www.acc.af.mil/library/weaponsandtactics.asp. An annual two-week event that focuses on joint war fighting, the Combat Air Forces Weapons and Tactics Conference brings together hundreds of war fighters from the combat air forces to discuss current issues, look at future issues, and provide solutions for the joint employment of forces. New technology is a key area. Although mostly Air Force personnel attend, the conference has seen an increase in participation from the Army, Navy, and Marines.

53. As an instructor at MAWTS-1, the author flew in AH-64D, F/A-18D, F-16DG, and AH-6M aircraft, an experience that gave him invaluable insight into serving as a CAS and FAC(A) instructor in the AH-1W.

54. Joint mission-essential task lists, developed for units performing specific missions, are derived from the universal joint task list outlined in Chairman of the Joint Chiefs of Staff Manual 3500.04D, *Universal Joint Task List*, 1 August 2005.

55. Air Force pilot, interview by the author, November 2006. The pilot admitted to having never read the JCAS publication but acknowledged that his platform conducted CAS, albeit not as a primary mission.

56. Manuals on training and readiness outline the academic and flight-training requirements for Marine AH-1W and UH-1N pilots who perform CAS. See http://www.tecom.usmc.mil/atb/Training%20and%Readiness.htm.

57. "Fort Rucker, Alabama: Command and Directorates," http://www.united-publishers.com/rucker/command.html#des.

58. After attending the Air Force Weapons School or the Marine Weapons and Tactics Instructor Course, graduates receive a patch to wear on their flight suits signifying that they have completed the course.

A Practical Approach to Effects-Based Operational Assessment

Capt Clinton R. Clark, USAF, Retired
Capt Timothy J. Cook, USAF*

Editorial Abstract: Operational assessment is the joint force air component commander's process for evaluating joint air, space, and cyber operations. The authors provide a commonsense methodology that greatly enhances the evaluation of effects-based operations, enabling strategists to answer two fundamental questions: "Are we doing things right?" and "Are we doing the right things?" The answers to these questions will assist decision makers in executing more efficient and effective operations while considering operational risk.
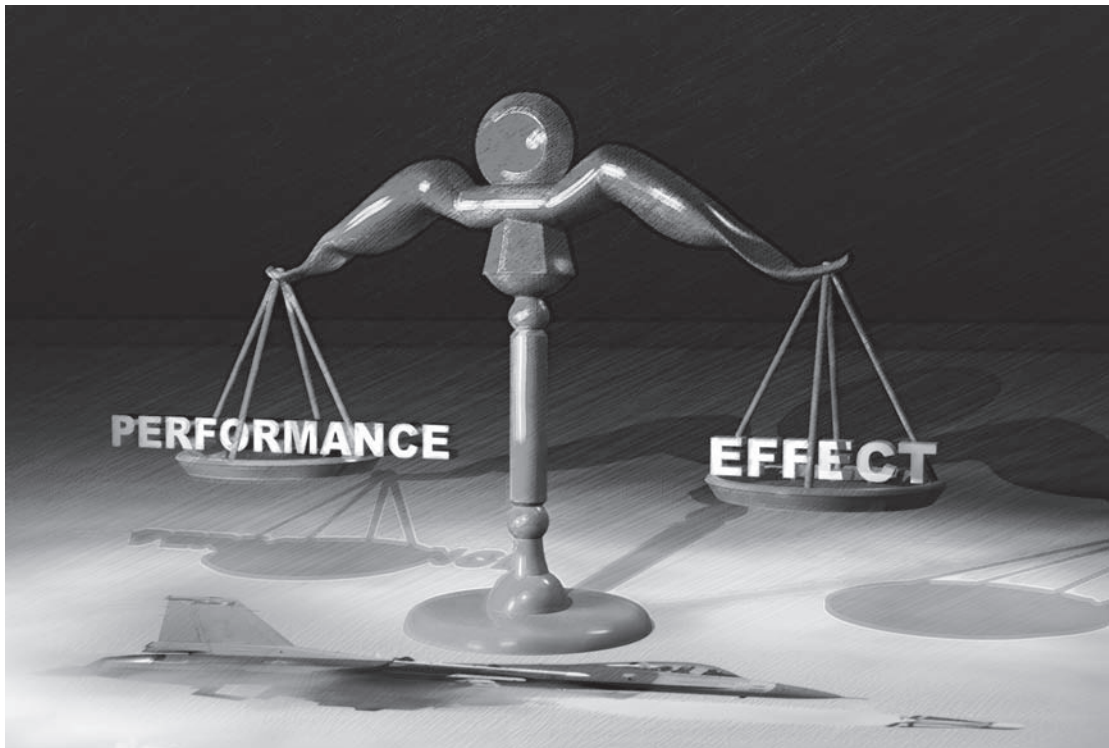
EFFECTS-BASED OPERATIONS (EBO) are "actions taken against enemy systems designed to achieve specific effects that contribute directly to desired military and political outcomes."[1] Huh? Perhaps more clearly, EBO is simply a "way of thinking" about military operations.[2] An effects-based approach to operations (EBAO) offers a "better way of expressing what EBO really is," and Air Force doctrine has recently adopted the term *EBAO* to add clarity to these concepts.[3] The crux of EBAO lies in the explicit linkage of tactical actions to operational and strategic military effects. Ultimately, its goals call for the efficient and effective use of scarce resources to produce the commander's desired effects.

The joint force air component commander (JFACC) derives specified and implied tasks from the joint force commander's (JFC) guidance. Translated into the JFACC's mission, these tasks serve as the basis for determining his or her operational objectives. The JFACC utilizes the joint air and space operations center (JAOC) as the primary means of commanding and controlling the planning, execution, and assessment of operations designed to fulfill his or her objectives. Within the JAOC, the strategy division has responsibility for developing, refining, disseminating, and assessing the JFACC's air and space strategy.[4] The operational assessment (OA) team supports the division throughout the strategy-development process; however, it focuses primarily on "evaluating the effectiveness and efficiency" of joint air operations.[5] In other words, the team provides joint air *operational-level* assessments to the JFACC. Thus, this article confines itself to OA.

Several senior Air Force leaders have shown interest in developing and refining OA methodologies and tools, believing that the service needs a sound, effects-based OA methodology to implement EBAO successfully. This article details an effects-based OA framework that emerged from a survey of existing OA techniques, an in-depth review of joint and Air Force doctrine, and consultation and collaboration with numerous strategists and war fighters.

The Evolution of Operational Assessment

Responsible for attaining multiple operational objectives that compete for scarce air, space, and cyber resources, the JFACC makes resource-allocation decisions for each air tasking order (ATO), based on his or her assessment of the operation. Consequently, the OA team exists to help the JFACC make informed decisions. Fundamentally then, OA deals with decision making—a potentially complicated and confusing process, though one that need not rely exclusively on "gut feel."[6] To develop and refine its OA methodologies, the JAOC can leverage a large body of decision-making techniques that have been successfully implemented across "a wide variety of situations."[7] According to John S. Hammond, Ralph L. Keeney, and Howard Raiffa,

> an effective decision-making process fulfills these six criteria:
>
> - It focuses on what is important.
> - It is logical and consistent.
> - It acknowledges both subjective and objective factors and blends analytical with intuitive thinking.
> - It requires only as much information and analysis as is necessary to resolve a particular dilemma.
> - It encourages and guides the gathering of relevant information and informed opinion.
> - It is straightforward, reliable, easy to use, and flexible.[8]

All of the OA techniques in use across the JAOCs through mid-2006 violated two or more of these criteria. This section briefly reviews the evolution of OA and the most common practices in the field today.

Going with Your Gut

Assessing the situation is an integral component of decision making. Before a strategy division and its OA team existed, commanders relied exclusively on gut feel to guide their assessment, drawing on years of tactical experience to process all of the intelligence and mission reports and using their intuition to assess how things were going. Although producing a

sound assessment depends upon such experience, the absence of an analytic approach for interpreting the data can leave room for bias and ultimately lead to bad decisions.

Adm Chester Nimitz demonstrated the shortcomings of this method when he assessed the preparatory bombardment of Iwo Jima, believing the explosive tonnage dropped by his forces "sufficient to pulverize everything on the island." The Marines, however, discovered an entirely different set of circumstances. During the bombing campaign, the Japanese actually increased the number of major defensive fortifications from 450 to over 750.[9] By relying exclusively on his experience, Admiral Nimitz reached a conclusion exactly the opposite of reality; namely, he believed that he had rendered the island indefensible, but in reality the Japanese had substantially increased their defensive capability.

Strategy to Task

The strategy-to-task framework, a hierarchical structure, establishes a coherent chain linking tactical-level tasks all the way up to the national security strategy. Since its introduction to strategy-to-task thinking in 1989, the Air Force has widely applied it to the planning of joint air operations and is typically documenting this technique in a joint air operations plan or an air operations directive.[10] In general, strategy-to-task hierarchies have focused on targets, using the following structure:

- operational objective (OO)
  - tactical objective (TO)
    - tactical task (TT)
      - measure of performance (MOP)

Table 1 depicts a notional, admittedly incomplete, strategy-to-task hierarchy for a single OO. In general, a JFACC has multiple such objectives, each requiring a strategy-to-task hierarchy. The strategy-to-task hierarchy introduced a logical thought process into military planning and assessment activities, but it lacked a means of accurately determining the resulting effects of military operations.

The "Roll-Up" Model

A roll-up model of the strategy-to-task hierarchy served as the foundation for the first major effort to add quantitative analysis to JAOC OA, pioneered by United States Air Forces in Europe (USAFE). The logic and mathematics of

Table 1. Generic strategy-to-task hierarchy for one operational objective

```
OO:  Gain and maintain air superiority
     TO:  Degrade enemy surface-to-air missile (SAM) systems
          TT:  Destroy enemy SA-2 systems
               MOP:  Percent of known enemy SA-2 launchers destroyed
               MOP:  Percent of known enemy SA-2 radar vans destroyed
          TT:  Degrade enemy SA-3 systems
               MOP:  Percent of known enemy SA-3 launchers destroyed
               MOP:  Percent of known enemy SA-3 radar vans destroyed
     TO:  Degrade enemy air forces
          TT:  Degrade enemy airfields
               MOP:  Percent of enemy airfields nonoperational
               MOP:  Percent of enemy airfields with limited operations
          TT:  Destroy enemy aircraft
               MOP:  Percent of enemy fighters destroyed
               MOP:  Percent of enemy bombers destroyed
     TO:  Degrade command, control, and communication of enemy integrated air defense
          TT:  Degrade higher-headquarters communication links
               MOP:  Percent of higher-headquarters facilities destroyed
          TT:  Degrade operational-level communication links
               MOP:  Percent of sector operations centers destroyed
```

this model are quite simple, the former assuming that the completion of a set of activities at one level of the hierarchy implies the completion of another at the next. For example, completing all of the TTs (destroy enemy SA-2 systems and degrade enemy SA-3 systems) implies achievement of the TO (degrade enemy SAM systems). Carrying out the TOs (degrade enemy SAM systems; degrade enemy air forces; and degrade command, control, and communication of the enemy's integrated air defense) implies meeting the OO (gain and maintain air superiority). To create a mathematical model, we assign weights to each line in the hierarchy, indicating the relative importance of each MOP, TT, and TO. Rolling up (using weighted averages) the lower-level scores, beginning with an initial value for each MOP, generates a score for each OO. We typically refer to such roll-up models as linear weighted-additive models.

Although the USAFE model made great strides within OA, it suffered from two major shortfalls. First, the logic assumes that our understanding of the enemy system matches reality. In other words, faulty intelligence combined with traditional planning approaches can lead to lower-level actions that do not roll up to complete higher-level objectives. Second, this model focuses solely on carrying out tasks in the strategy-to-task hierarchy while disregarding the key elements of the operational plan—the commander's desired effects. Not perfectly suited for assessment of EBAO, this model nevertheless provides the natural stepping-stone to methodologies that combine performance and effects in a mathematically logical, yet straightforward, approach.

Rolling Up with Effects

As EBAO spread, the joint air estimate process evolved to support its concepts. Although varying approaches exist, each JAOC has begun to transform the strategy-to-task structure into an effects-based planning and assessment tool. OA models began providing a "roll-up score" that combined both performance and effects metrics. Doing so, however, violated the major mathematical assumptions of linear weighted-additive models, often yielding meaningless results. In all cases, the OA team had to employ qualitative "override" scoring inputs. In terms of the bottom line, evaluating performance and effects metrics together broke the model, and OA teams regressed to relying on gut feel.

A Brief Discussion of Measures

Measures define the degree to which we accomplish something.[11] For our purposes, measures of effectiveness (MOE) define the degree to which we produce effects, and MOPs define the degree to which we have completed tasks. The use of MOEs and MOPs lets us provide unambiguous evaluations of how well we generate effects or perform tasks.[12]

The proposed assessment model takes the form of a linear weighted-additive model—sometimes called an additive utility function.[13] Therefore, the units of measurement must be uniform: we can't add apples to oranges without first applying a mathematical transformation to equate the units. To facilitate this process, we transform apples and oranges into a normalized "value" via an individual utility function.[14] That is, we transform the attributes associated with an apple or an orange into a value on the range [0, 1] based on the commander's belief system. An example appropriate to an air operations plan would equate the number of enemy fighters destroyed to the combat effectiveness of enemy ground forces. Figure 1 offers examples of individual utility functions for notional MOPs and MOEs.

As an extension of the models briefly discussed, the methodology presented in this article overcomes the mathematical limitations and enables the OA team to assess both desired operational effects and the performance of planned actions simultaneously. Its development grew out of experience in the JAOC strategy divisions along with the support of many JAOC OA personnel, EBAO experts, and Air Force senior mentors. The approach meets the six requirements for a sound decision-making tool and thus provides a clear, simple structure for conducting solid OAs.
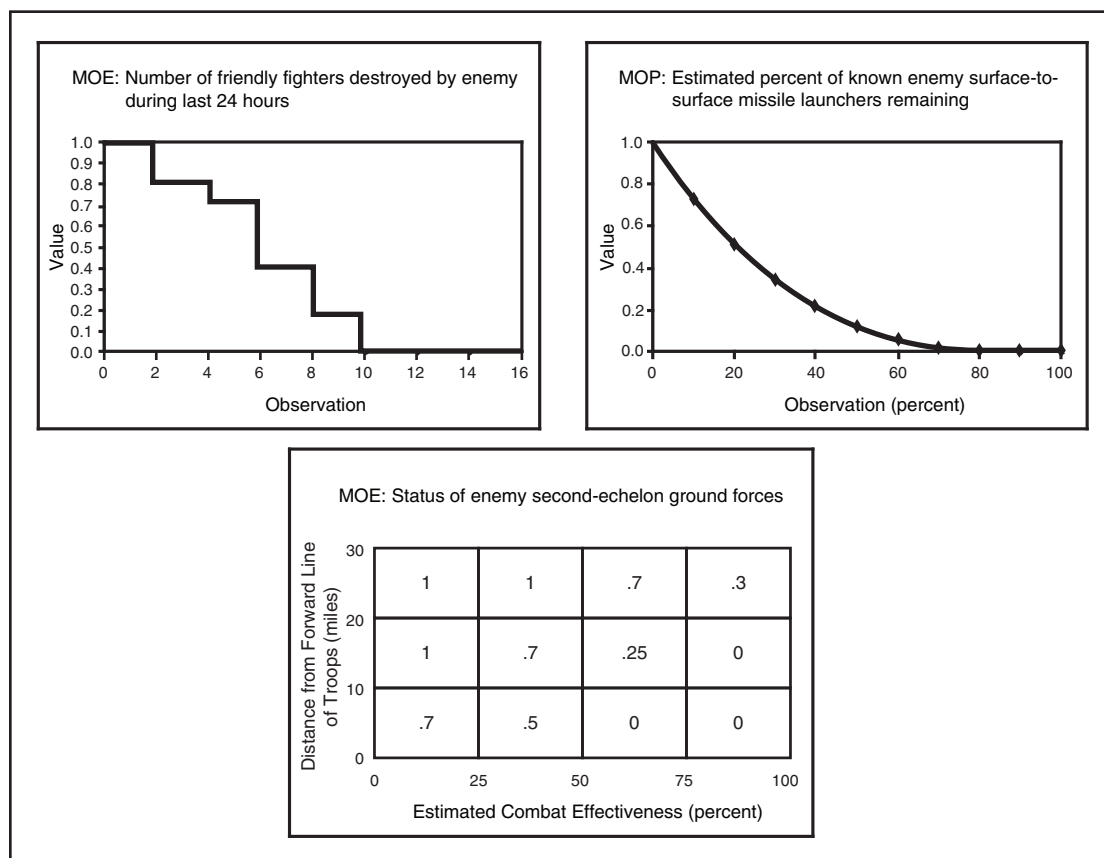
Figure 1. Sample individual utility functions

A Practical Methodology for Operational Assessment

Given one tenet of this article—that OA must support the effective and efficient use of air, space, and cyberspace power—OA must answer two fundamental questions: Are we doing things right? Are we doing the right things? The first question addresses the performance of planned air operations by focusing the assessment on the completion of tasks. The second considers the efficient use of scarce air-power resources by focusing on production of the JFACC's desired effects. The synergy between the answers enables the OA team to provide the commander with actionable information upon which to base decisions about the direction of the strategy. Inherent in this process is the capability to point out areas with greater operational risk—highlighting potential trade-offs for allocation decisions.

Figure 2 provides an overview of the effects-based OA process, which ties directly to the air operations plan. The "plan" should detail the JFACC's desired operational-level effects with corresponding MOEs and success indicators. In addition, it should detail the tasks the JFACC considers necessary to achieve his or her objectives as well as the corresponding MOPs for these tasks. The remainder of this article assumes the validity of the operational-planning structure (mission➜objectives➜effects➜tasks) of Joint Publication (JP) 5-0, *Joint Operation Planning*.[15] To assess an air operations plan, we

construct two mathematically independent models—one to evaluate fulfillment of the JFACC's desired *effects* and a second to evaluate the *performance* of the JFACC's planned tasks. "Several good reasons" exist for objectively quantifying the subjectively built plan into models.[16] The primary reason: they help clarify the meaning of the effects and "[facilitate] all aspects of decisionmaking."[17]

Tasks, Effects, and Causal Links

We perform tasks to create effects—the necessary links to achieving objectives. While independently scoring *effect* and *performance*, OA teams must maintain *task* and *effect* linkages when making overall assessments. Separating tasks and effects may marginalize or overemphasize one or the other and may diminish the linkage between the two, which lies at the very heart of effects-based thinking. This assessment methodology is designed to explicitly assess these linkages through the juxtaposition of effect and performance results.

In addition, when we pay attention to causal links, mathematically independent scoring models for effect and performance provide great utility since they help highlight "weight of effort" and "achievement of objective" trade-offs. This approach proves especially useful during the planning phase since it helps mitigate the dangers of assessments becoming too "fuzzy"; however, we must balance it against a desire to perform an overly quantitative assessment.

Notation

Before describing the detailed mathematics in our methodology, we would do well to introduce the notation that we will use, especially that dealing with weighting, scoring, and indexing in relation to our overview of assessment methodology (fig. 3). A *w* represents the relative importance weight. For example, $w_{(i)}$ refers to the relative importance weighting of objective *i*. *M, O, E,* and *T* represent calculated scores for various plan levels: missions, objectives, effects, and tasks, respectively. Subscripts
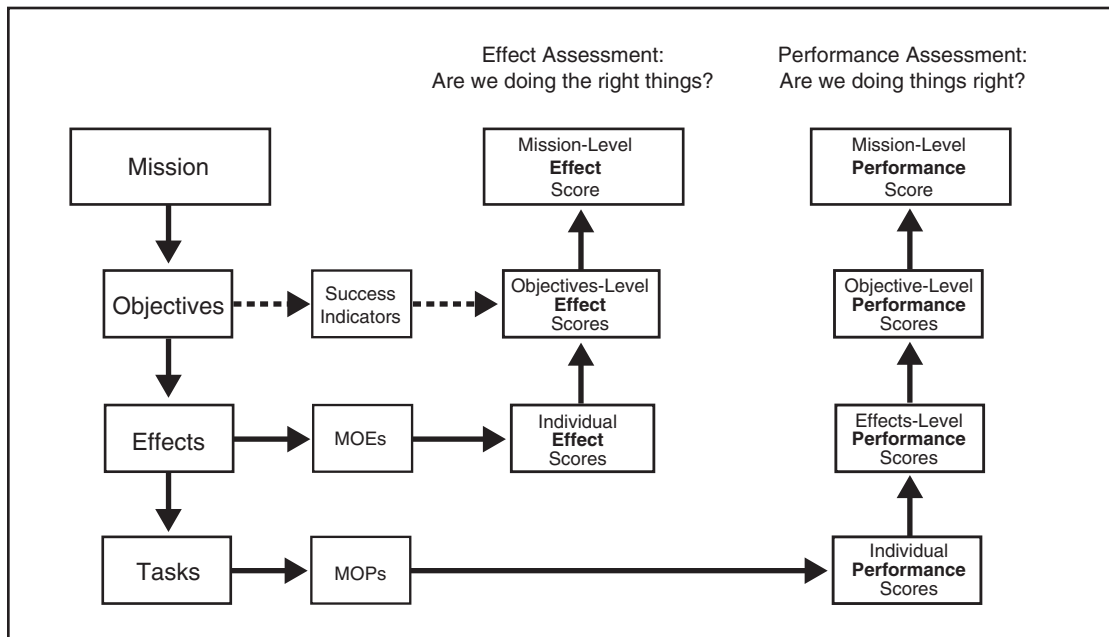
Figure 2. Overview of operational-assessment methodology. (The dashed lines to and from the "Success Indicators" block denote that those indicators may add value to the model but are not necessary for it to be effective.)
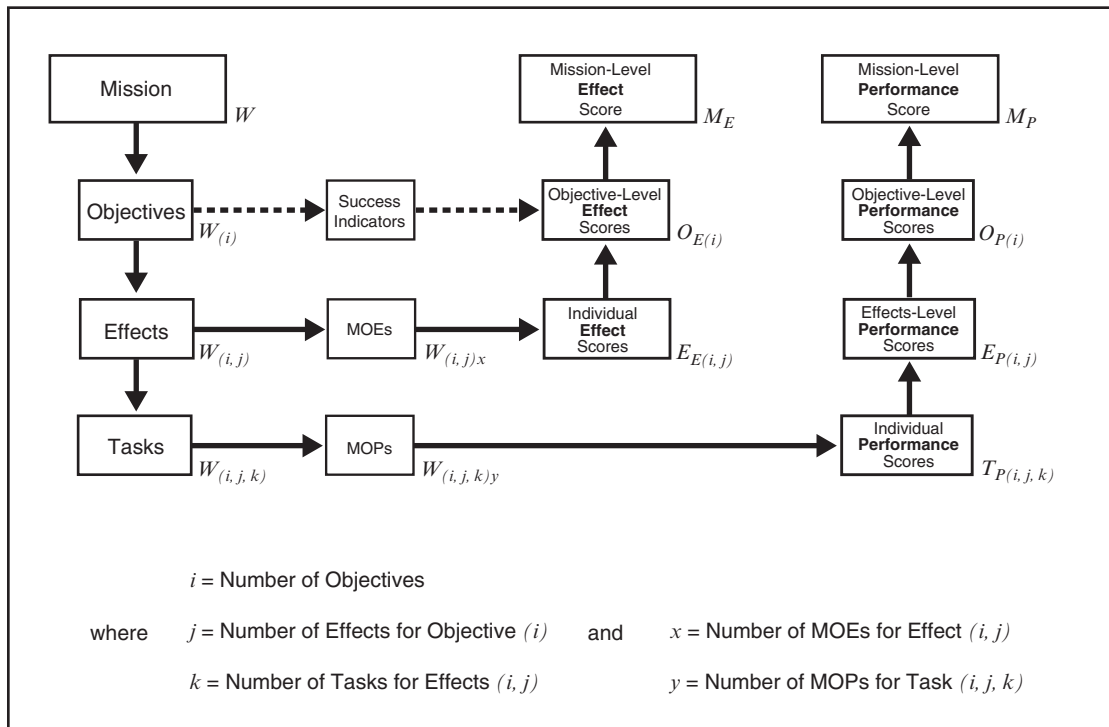
Figure 3. Assessment-structure notation

$_E$ and $_P$ indicate effect and performance scores, respectively. For example, $O_{E(i)}$ refers to the objective-level effect score for objective i.

Effect and Performance Scoring

We assess effects and performance with two mathematically independent, linear weighted-additive models. The mathematical mechanics involve an iterative process that repeats the similar steps for each level in the model hierarchy. At the lowest levels, each effect has a number (x) of MOEs associated with it, and each task has a number (y) of MOPs associated with it. In addition, we assign each MOE and MOP a weight reflecting relative importance. For each assessment period, we observe values associated with each MOE and MOP and input them into their respective models. Figure 4 outlines the effects-scoring model; figure 5 outlines the performance-scoring

model. The MOE and MOP scores, between 0 and 1, indicate the level of a particular effect or task, respectively. A score of 1 indicates complete success—at least temporarily. This holds true for all scores at each level.

Operational Assessment

The JFACC allocates resources to perform tasks, which create effects. The methodology presented gives the OA team a process to assess our performance of tasks and determine if these tasks produce the desired effects. A high score for performance suggests completion of many of the planned tasks. A high score for effect suggests achievement of many of the JFACC's desired effects. Low scores for performance and effect naturally have an opposite interpretation. Drawing inferences based on comparing the resulting scores for performance and effect represents one key to this

Mission	$M_E = w_{(1)}O_{E(1)} + w_{(2)}O_{E(2)} + ... + w_{(i)}O_{E(i)}$ where $\sum_{n=1}^{i} w_n = 1$ Equation 1: Mission-Level *Effect* Scores
Objective	$O_{E(i)} = w_{(i,1)}E_{E(i,1)} + w_{(i,2)}E_{E(i,2)} + ... + w_{(i,j)}E_{E(i,j)}$ where $\sum_{n=1}^{j} w_{(i,n)} = 1$ Equation 2: Objective-Level *Effect* Scores
Effect	$E_{E(i,j)} = w_{(i,j)_1}MOE_{(i,j)_1} + w_{(i,j)_2}MOE_{(i,j)_2} + ... + w_{(i,j)_x}MOE_{(i,j)_x}$ $\sum_{n=1}^{x} w_{(i,j)_n} = 1$ Equation 3: Individual *Effect* Scores
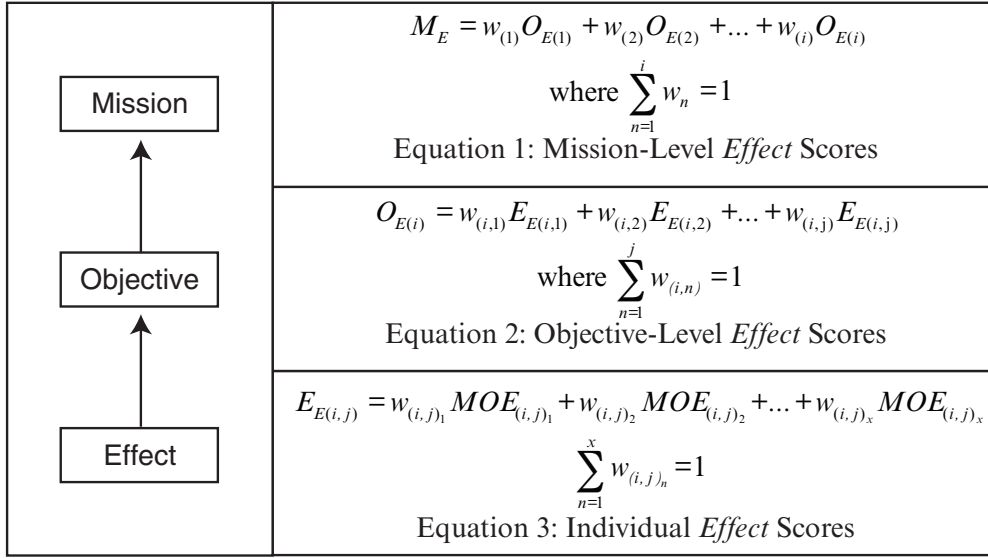
Figure 4. Equations for effects roll-up model

Mission	$M_P = w_{(1)}O_{P(1)} + w_{(2)}O_{P(2)} + ... + w_{(i)}O_{P(i)}$ where $\sum_{n=1}^{i} w_{(n)} = 1$ Equation 4: Mission-Level *Performance* Scores
Objective	$O_{P(i)} = w_{(i,1)}E_{P(i,1)} + w_{(i,2)}E_{P(i,2)} + ... + w_{(i,j)}E_{P(i,j)}$ where $\sum_{n=1}^{j} w_{(i,n)} = 1$ Equation 5: Objective-Level *Performance* Scores
Effect	$E_{P(i,j)} = w_{(i,j,1)}T_{P(i,j,1)} + w_{(i,j,2)}T_{P(i,j,2)} + ... + w_{(i,j,k)}T_{P(i,j,k)}$ where $\sum_{n=1}^{k} w_{(i,j,n)} = 1$ Equation 6: Effect-Level *Performance* Scores
Task	$T_{P(i,j,k)} = w_{(i,j,k)_1}MOP_{(i,j,k)_1} + w_{(i,j,k)_2}MOP_{(i,j,k)_2} + ... + w_{(i,j,k)_y}MOP_{(i,j,k)_y}$ where $\sum_{n=1}^{y} w_{(i,j,k)_n} = 1$ Equation 7: Individual-Task *Performance* Scores

Figure 5. Equations for performance roll-up model

methodology. Table 2 provides some generalized interpretations for various combinations of high and low scores for performance and effect.

We can characterize the independent scores for performance and effect in three ways: (1) similar, (2) performance > effect, and (3) effect > performance. Similar scores suggest that the operation is proceeding as expected—that our understanding of the enemy system and the causal linkages between tasks and effects appears correct. In this case, we produce effects in proportion to the level at which we carry out subordinate tasks.

Disconnects between scores for effect and performance indicate that portions of the plan may require further examination. When performance scores are higher than effect scores, the completion of tasks, to this point, has not created the desired effects. Numerous issues—including data latency, delayed effects, or a misunderstanding of the enemy system—can drive such score mismatches. For example, we may have confirmation of successful leaflet drops (performance) supporting special-operations efforts to turn the local populace against the government (effect), but due to a communications outage we cannot receive reports of civilian uprisings (MOE). In addition, we may have battle damage assessment indicating destruction of all enemy fuel storage (performance), but we won't see how it affects enemy operations (effects) for two weeks. Finally, we may have destroyed all national power production (performance) to limit enemy command and control, but because the enemy employs couriers and handheld radios as his primary means of communication, command and control remains intact (effect).

In other words, our assumptions about direct links between the achievement of objectives and their prerequisite, lower-level effects and tasks may be flawed. In fact, the OA process may prove most valuable under these conditions. In this case, OA should focus primarily on quickly identifying and recommending required changes to the plan.

Conversely, when effect scores are higher than performance scores, we have produced desired effects without the comparable com-

Table 2. Interpretation of generalized operational-assessment results

	Low Performance	High Performance
High Effect	Performance: We have done little to affect the enemy system. Effect: We are achieving our desired effect. Interpretation: Situation is different than expected. We have exerted much less effort than expected to achieve our desired effect. Shifting resources may be an option but could entail assuming risk.	Performance: We have significantly degraded the enemy system. Effect: We are achieving our desired effect. Interpretation: Situation as expected. We have exerted significant effort to achieve our effect. The OA team may recommend shifting resources with low operational risk.
Low Effect	Performance: We have done little to affect the enemy system. Effect: The enemy is denying us our desired effects. Interpretation: Situation as expected. We have exerted minimal effort and are not achieving effect. Look for opportunities to shift resources to this objective.	Performance: We have significantly degraded the enemy system. Effect: The enemy is denying us our desired effects. Interpretation: Situation is different than expected. We have exerted significant effort but have not achieved the desired effect. This could indicate a faulty understanding of the system, so we need to adjust our plan to go after the "right things."

Performance

pletion of subordinate tasks. Numerous issues, including data latency, enemy deception, good fortune, and a misunderstanding of the enemy system could lead to these score mismatches. For example, we do not have battle damage assessment from our strikes on the enemy's strategic SAMs (performance), but he has not launched them during the last five ATOs (effect). Further, although we haven't taken any action against enemy fighters (performance), the enemy has chosen not to fly. This situation may arise simply due to the fact that the enemy has hidden these aircraft in caves; regardless, our air operations have proceeded without inhibition (effect).

In this case, our potentially mistaken assumptions about task and effect linkages may enable a reallocation of resources. Identifying these opportunities will allow the JFACC to execute operations more efficiently. The OA team should now focus on identifying which objectives warrant additional resources and on determining operational risk (based on remaining enemy capability) assumed by the JFACC if resources shift to other objectives. Situations of high scores for effect with low scores for performance can quickly reverse themselves, for example, if the enemy brings his aircraft out of hiding.

Where Is the Operational Art?

The process of developing an effective strategy requires "significant creativity and hard thinking" and must involve the entire strategy team, consisting of operations, intelligence, logistics, analysis, and sister-service personnel.[18] Development of the plan's structure—the decomposition from missions to tasks—is an entirely qualitative process based on the experiences and judgment of strategists. Additionally, assigning weightings for relative importance and choosing success indicators, MOEs, and MOPs must be based on the knowledge and experiences of the entire strategy team.

Well-structured plans provide the basis for the use of quantitative-assessment models.[19] Therefore the OA team must play a critical role in developing the air operations plan to ensure the ability to assess results accurately.

But offering effective strategy recommendations requires that we view the results produced by this quantitative model in the context of the operation. At this point, the strategist's application of operational art becomes critical.

The science of this methodology generates scores, not assessments. Producing OAs requires a blend of operational art and mathematical science. The models produce scores that draw attention to areas of interest. Nevertheless, we must investigate the results for cause-effect relationships and bring into play the trained eyes of experienced strategy professionals to interpret them. The scores will highlight opportunities for recommendations to "stay the course," "change the plan," or "shift weights of effort"; ultimately, though, such decisions will emerge only after collaboration with the entire strategy team.

Where Is the Data?

Lack of data represents a real problem for all analytic OA methodologies, including this one. We find data-collection and dissemination challenges in every theater, and we must plan for them. Experience and sound judgment, already a necessary ingredient for quality assessments, increase in importance when we do not possess the required information (military intelligence, battle damage assessments, mission reports, etc.) for assessment models. The reality of limited data, however, does not relieve the OA team of its responsibilities to develop a sound assessment structure, identify intelligence and other information requirements, and conduct a sound OA.

Even in the worst cases of data deficiency, great benefits accrue to implementing an assessment methodology such as that described in this article since this "structuring . . . results in a deeper and more accurate understanding of . . . the decision context."[20] Further, by providing a sound analytic framework, the OA team will have a frame of reference when it discusses confidence in results. The team can couch OA results and recommendations in terms of data availability, providing the JFACC

greater insight into the balance of art and science in the current assessment.

Finally, a consistent and methodical approach to OA can counter the inevitable effects of a lack of continuity in the JAOCs. Although a lack of data, combined with the constant rotation of personnel assigned to the JAOC, may seem an impenetrable barrier to sound OA, a method such as the one proposed here can reassure the JFACC that assessments and recommendations are based upon a consistent approach.

Methodology Demonstration

This section applies the OA methodology developed in the previous section to a no-tional example (see table 3 for a generic plan framework). Admittedly incomplete, the plan nevertheless highlights the benefits of effects-based OA. The responsibility for developing such a plan falls to the strategy division, of which the OA team is a critical component. Therefore, the team should not undertake this task alone; conversely, it must not be excluded during development of the hierarchy. Any strategy-to-task hierarchy constructed without assessment in mind from the beginning will likely contain immeasurable portions that will force assessment back into the realm of an exclusively gut feel.[21]

Now that the plan is complete, we can build the effect and performance models. Figure 6 depicts the effect-scoring model for our generic

Table 3. Generic strategy-to-task hierarchy

Mission: Restore sovereignty of allied nation
    Objective$_{(1)}$: Gain and maintain air superiority throughout the joint operations area
        Effect$_{(1,1)}$: Friendly fighters unaffected by enemy action
                MOE$_{(1,1)1}$: Number of friendly fighters destroyed by enemy in last 24 hours
                MOE$_{(1,1)2}$: Number of friendly fighters damaged by enemy in last 24 hours
                MOE$_{(1,1)3}$: Number of friendly fighter retrogrades due to enemy action in last 24 hours
        Task$_{(1,1,1)}$: Degrade enemy SAM systems
                MOP$_{(1,1,1)1}$: Percent of known enemy SAM launchers destroyed
                MOP$_{(1,1,1)2}$: Percent of known enemy SAM radar vans destroyed
        Task$_{(1,1,2)}$: Degrade enemy air-to-air capabilities
                MOP$_{(1,1,2)1}$: Percent of enemy airfields nonoperational
                MOP$_{(1,1,2)2}$: Percent of enemy airfields with limited operations
                MOP$_{(1,1,2)3}$: Percent of enemy fighters destroyed
        Effect$_{(1,2)}$: Friendly ground forces have freedom from enemy air action
                MOE$_{(1,2)1}$: Number of friendly ground casualties due to enemy action in last 24 hours
                MOE$_{(1,2)2}$: Number of friendly battalion-sized units halted prior to objective
        Task$_{(1,2,1)}$: Destroy enemy air-to-ground capabilities
                MOP$_{(1,2,1)1}$: Percent of known enemy air-to-ground fighters destroyed
                MOP$_{(1,2,1)2}$: Percent of known enemy bombers destroyed
                MOP$_{(1,2,1)3}$: Percent of known enemy attack helicopters destroyed
    Objective$_{(2)}$: Prevent enemy second-echelon forces from reinforcing main effort
        Effect$_{(2,1)}$: Enemy second-echelon forces unable to reach main battle area at combat-effective strength
                MOE$_{(2,1)1}$: Status of Red Battalion (miles from friendly troops and estimated combat strength)
                MOE$_{(2,1)2}$: Status of Purple Battalion (miles from friendly troops and estimated combat strength)
        Task$_{(2,1,1)}$: Destroy available avenues of approach
                MOP$_{(2,1,1)1}$: Percent of key river crossings destroyed
        Task$_{(2,1,2)}$: Destroy second-echelon forces
                MOP$_{(2,1,2)1}$: Estimated combat effectiveness of Red Battalion
                MOP$_{(2,1,2)2}$: Estimated combat effectiveness of Purple Battalion

Based on Joint Publication (JP) 5-0, *Joint Operation Planning*, 26 December 2006, III-60, http://www.dtic.mil/doctrine/jel/new_pubs/jp5_0.pdf.

plan, including the model structure and relative importance weights for each objective, effect, and MOE. Figure 7 provides the structure of the performance-scoring model, with relative importance weights shown for each objective, effect, task, and MOP.
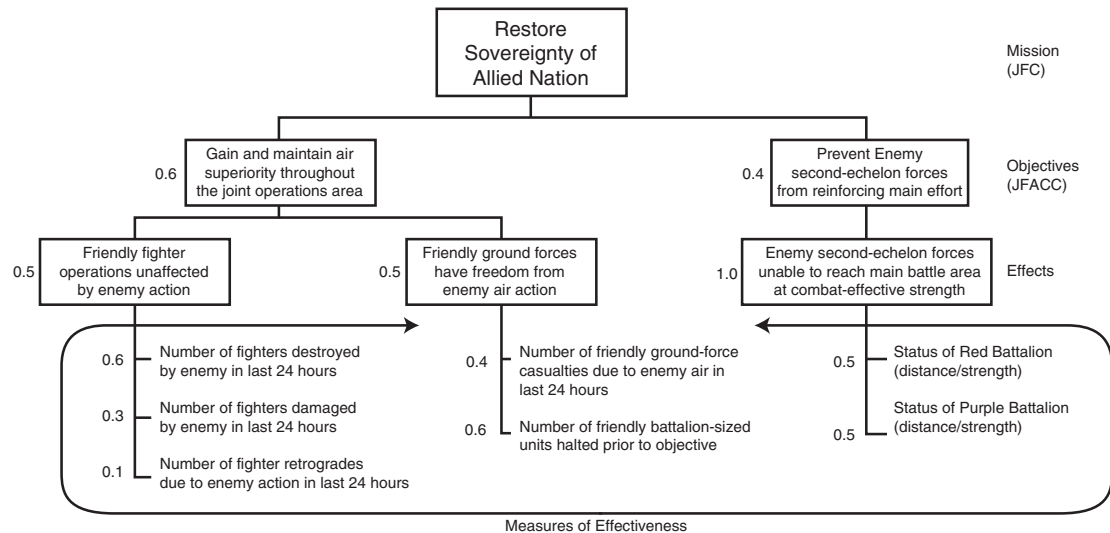
Figure 6. Effect-scoring model with weights
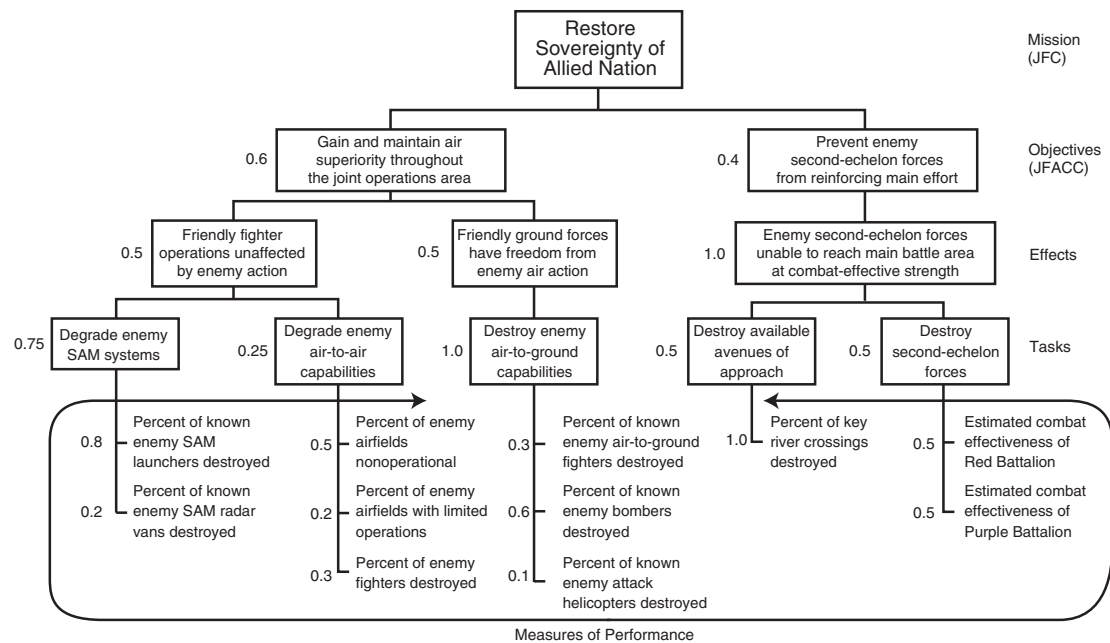
Figure 7. Performance-scoring model with weights

We can use several techniques, such as "pricing out," "swing weighting," or "lottery weights" to derive the hierarchy weights.[22] A detailed discussion of these methods lies beyond the scope of this article, but it is important to note that the method chosen depends upon the personality, values, and experience of the commander—not the analyst. The method most straightforward to the commander will prove most useful in eliciting his or her true belief system.

With the structure defined and weights elicited, we can build an assessment tool. The calculations required by this methodology are rudimentary enough to be performed by hand, with a calculator, or in a simple spreadsheet model. The next section highlights the simple mathematics required to produce effect and performance scores for this notional example.

Model Calculations for Air Tasking Order "A"

This section walks the reader through the mathematical mechanics of our methodology for a sample data set. Tables 4 and 5 supply notional data for one ATO period we call "ATO A." The "Observed" column contains notional observations, and the "Value" column the resulting individual utility scores. Again, higher scores are better, with a maximum value of one.

The calculations below determine the individual effect score for the notional effect

Table 4. Sample MOE inputs for ATO A

Measures of Effectiveness	ATO A	
	Observed	Value
MOE: Number of fighters destroyed by enemy in last 24 hours	6	**0.4**
MOE: Number of fighters damaged by enemy in last 24 hours	21	**0**
MOE: Number of fighter retrogrades due to enemy in last 24 hours	12	**0.1**
MOE: Number of friendly ground-force casualties due to enemy air in last 24 hours	400	**0**
MOE: Number of friendly battalion-sized units halted prior to objective	0	**1**
MOE: Status of Red Battalion (miles from friendly troops and estimated combat strength)	65 mi, 95%	**1**
MOE: Status of Purple Battalion (miles from friendly troops and estimated combat strength)	25 mi, 95%	**0.3**

Table 5. Sample MOP inputs for ATO A

Measures of Performance	ATO A	
	Observed (%)	Value
MOP: Percent of known enemy SAM launchers destroyed	40	**0.4**
MOP: Percent of known enemy SAM radar vans destroyed	10	**0.1**
MOP: Percent of enemy airfields nonoperational	0	**0**
MOP: Percent of enemy airfields with limited operations	0	**0**
MOP: Percent of enemy fighters destroyed	10	**0.1**
MOP: Percent of known enemy air-to-ground fighters destroyed	5	**0.05**
MOP: Percent of known enemy bombers destroyed	5	**0.05**
MOP: Percent of known enemy attack helicopters destroyed	0	**0**
MOP: Percent of key river crossings destroyed	20	**0.2**
MOP: Estimated combat effectiveness of Red Battalion	95	**0.05**
MOP: Estimated combat effectiveness of Purple Battalion	95	**0.05**

"friendly fighter operations unaffected by enemy action," using equation 3 ("individual effect scores"), the weights from figure 6, and the values from table 4. For each MOE, we multiply the assigned relative-importance weighting by its observation value from ATO A. We then sum the three MOE scores to produce the individual effect score of 0.25. As previously stated, scores are between 0 and 1; a score of 0.25 would indicate to the OA team that we have far to go to realize the desired effect.

$$E_{E(1,1)} = w_{(1,1)_1} MOE_{(1,1)_1} + w_{(1,1)_2} MOE_{(1,1)_2} + w_{(1,1)_3} MOE_{(1,1)_3}$$

$$E_{E(1,1)} = (0.6)(0.4) + (0.3)(0) + (0.1)(0.1)$$

$$E_{E(1,1)} = 0.24 + 0 + 0.01$$

$$E_{E(1,1)} = 0.25$$

Using inputs from figures 4 and 5, the weights from figures 6 and 7, and equations 1–7, we computed the effect and performance scores for the mission, objective, and effect levels as well as the performance scores for each task. Table 6 contains all the calculated effect and performance scores for ATO A. The next section discusses interpretation of results.

Presentation of Assessment Results

The methodology described in this article and its associated calculations are critical to producing a sound, effects-based OA. For the JFACC, however, a picture is often worth 1,000 words. Because a briefing typically presents the JFACC with the OA results, we must convey this large amount of information clearly and concisely in a short period of time, tailoring presentation techniques to the preferences of each JFACC. We offer some sample presentation options here.

For demonstration purposes, we present results for a notional subsequent ATO that we call "ATO D," which has four objectives: air superiority (AS), counterland (CL), countermaritime (CM), and information superiority (IS). In addition, we set thresholds for "stoplight charts" so that scores less than 0.3 are red, scores from 0.3 to 0.7 are yellow, and scores above 0.7 are green. We would set actual assessment thresholds through collaboration with the JFACC.

The first, and perhaps most important, assessment slide presented to the JFACC provides an overall assessment across his or her objectives. It offers a quick status of the operation; allows the JFACC to swiftly determine the progress of air, space, and cyber activities; and identifies risk areas and potential resource trade-offs between missions. Figure 8 provides a notional macro ATO D assessment across the four JFACC missions described above.

This figure clearly indicates attainment of our desired air-superiority effects early in the

Table 6. Effect and performance scores for the notional example

	Effect Score	Performance Score
Mission: Restore sovereignty of allied nation	0.52	0.14
Objective$_{(1,1)}$: Gain and maintain air superiority throughout the joint operations area	0.43	0.15
Effect$_{(1,1,1)}$: Friendly fighters unaffected by enemy action	0.25	0.26
Task$_{(1,1,1,1)}$: Degrade enemy SAM systems		0.34
Task$_{(1,1,1,2)}$: Degrade enemy air-to-air capabilities		0.03
Effect$_{(1,1,2)}$: Friendly ground forces have freedom from enemy air action	0.60	0.05
Task$_{(1,1,2,1)}$: Destroy enemy air-to-ground capabilities		0.05
Objective$_{(1,2)}$: Prevent enemy second-echelon forces from reinforcing the main effort	0.65	0.13
Effect$_{(1,2,1)}$: Enemy second-echelon forces unable to reach main battle area at combat-effective strength	0.65	0.13
Task$_{(1,2,1,1)}$: Destroy available avenues of approach		0.20
Task$_{(1,2,1,2)}$: Destroy second-echelon forces		0.05
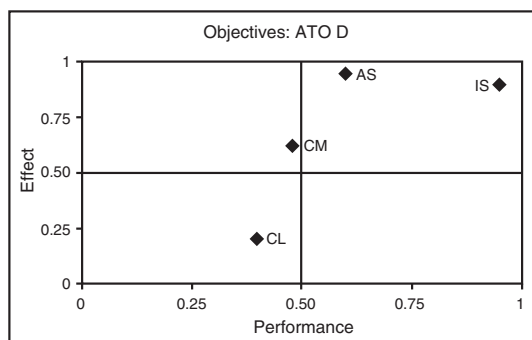
Figure 8. Macrolevel assessment of JFACC objectives

campaign (effect score: 0.95)—significantly more than expected, given the level of performance (performance score: 0.59) thus far. Before recommending strategy changes (such as shifting the weight of effort to other missions), the OA team should further investigate these results. Figure 9, an alternative display option, provides greater insight into air superiority. This graphic, focused on a single mission, supplies the JFACC with critical trend information, allowing quick observation of the daily progression of this objective and again reminding the JFACC that, although we can observe our desired effects, the enemy appears to retain a significant capability. Further, it seems that we have reached or are approaching a point of diminishing returns, in which continued effort applied to this objective will produce limited gains in desired effects. This
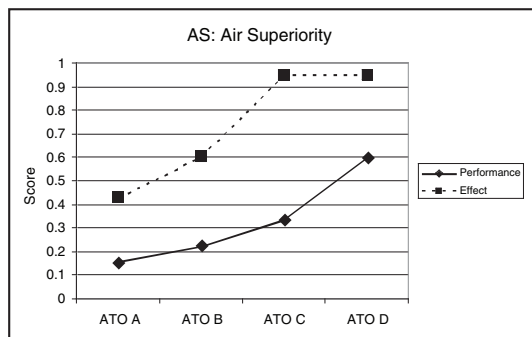
Figure 9. Air-superiority trend analysis

presentation format additionally affords the opportunity to observe the impacts of risk-acceptance decisions made across multiple ATOs by observing the daily interaction between effect and performance results.

To provide greater insight to the JFACC, the OA team should "peel the onion back" an additional layer. Figure 10, an in-depth look at a single air-superiority objective, permits additional insight by examining effect-performance discrepancies at the lowest levels. This "stop-light chart" highlights the cause that drives the difference in our overall effect and performance scores for air superiority. Although enemy fighters have not affected friendly fighter aircraft ("green" effect score), we have done little to degrade the adversary's fighter capability ("red" performance score).

This outcome highlights a potential disconnect in our assumed causal linkage for this task and effect, as well as an opportunity to reallocate scarce airpower resources. However, we could cite numerous explanations for this observation. The enemy may have redeployed his fighters deep within his borders—beyond our reach but available for use later (high future risk). He may have buried his aircraft in the desert, never to use them again (opportunity to reallocate resources). The enemy may be using his fighter aircraft for purposes we did not anticipate—ones that do not affect friendly fighter aircraft. However, enemy aircraft may be significantly affecting the JFC's campaign by posing a viable threat to neighboring nations (we may not understand the enemy system).

As needed, this approach allows the OA team to provide greater depth and breadth of assessment that will help the JFACC execute air operations more effectively and efficiently. Designed to support a strategist's recommendations to the JFACC, this methodology does not eliminate the need for operational art; rather, it quickly highlights areas of opportunity and risk for strategists to consider when they make recommendations to the JFACC.

Assess:
ATO D

Objective: Air Superiority

Effect Performance

Objective (1): Gain and maintain air superiority throughout
the joint operations area

Effect (1, 1): Friendly fighters unaffected by enemy action
Task (1, 1, 1): Degrade enemy SAM systems
Task (1, 1, 2): Degrade enemy air-to-air capabilities

Effect (1, 2): Friendly ground forces have freedom from
enemy air action
Task (1, 2, 1): Destroy enemy air-to-ground
capabilities

Enemy air-to-ground threat driving difference in *performance* and *effect*

Desired effects observed.
Enemy has numerous air-to-ground assets remaining.
    Remaining assets redeployed to bases near western border.
    Air-to-ground assets unable to reach friendly ground forces.
    Fuel issues will dramatically limit sortie-generation capability.
Recommendation: Reallocate resources assigned to task (1, 2, 1) to other tasks.

G=green
Y=yellow
R=red

Assess:
ATO D

Figure 10. Focused assessment of air superiority

Summary and Recommendations

OA will prove useful to the JFACC if it adds to his or her understanding of the campaign's progress. By independently evaluating performance and effect, the OA methodology described in this article provides a better understanding of the relationship between the actions of friendly forces and their impact on the enemy system. Previous OA methodologies suffered from various limitations that yielded difficult-to-interpret information when events did not proceed according to plan. Comparing performance and effect enables the JFACC to determine if he or she is doing things right and doing the right things. Armed with this knowledge, the JFACC can make adjustments to the strategy as required.

Real-World Implementations

Numerous JAOCs have implemented the assessment methodology presented in this article, Seventh Air Force having done so the most completely and effectively. After the OA team demonstrated the methodology during Exercise Ulchi Focus Lens 2006, the chief of the strategy division and the JFACC issued immediate guidance to adopt it. Following the exercise, the division chief focused his strategy rewrite conference on "planning for assessment," fully implementing the methodology in support of his strategy-development process for Seventh Air Force's primary war plan. The Seventh's

Reception, Staging, Onward-Movement, and Integration 2007 exercise validated the value of this methodology.

Thirteenth Air Force modified this approach to assess steady-state operations. The current pace of operations is such that the commander's decision brief (including OA reporting) occurs weekly. Due to the relatively low operations tempo, OA team members found that assessing performance on a weekly basis was a straightforward matter, but discerning changes in effects from week to week proved extremely difficult. To address this situation, they applied a similar approach to the one described in this article, separating the assessment of effects and performance. Under the new approach, the team briefs its assessment of performance to the JAOC commander each week. To accurately assess changes in effects, the OA team examines them over a longer time span (generally 60–90 days), thus providing the commander with a longer-term look at each objective while still allowing sufficient time for the changes in effect to become apparent.

Deployed analysts in Ninth Air Force implemented a similar approach in late 2005. The OA team assessing Operations Iraqi Freedom and Enduring Freedom struggled to provide the commander with an effects-based assessment of his objectives. In that case, team members decided to limit themselves to assessing performance, leaving the assessment of effects to the supported command, who briefed this to the deputy combined force air component commander along with a performance assessment conducted by the OA team.[23]

First Air Force's strategy division adopted the methodology presented here in 2006, during development of the joint air operations plan for Defense Support to Civil Authorities, designed to provide guidance for joint air operations during events similar to Hurricane Katrina. Exercise Ardent Sentry stressed this plan, and the OA methodology proved successful in supporting JFACC decision making during the exercise.

Applied across multiple theaters for a wide variety of operations, this methodology has supported homeland-defense scenarios as well as the development and exercising of strategy for a major theater war; a modified version has supported steady-state operations. However, we still have room to improve this approach.

The Way Ahead and Future Research Recommendations

The way ahead for OA calls for adopting a standard methodology across the JAOCs. Although each JFACC faces unique issues, a core set of assessment processes exists. We developed this methodology to support the core OA needs of the JFACCs while offering the flexibility needed to address their unique, area-specific issues. The first practical benefit of adopting a standardized approach would involve rapid methodological improvements arising from the inevitable collaboration across JAOCs.

The first step to establishing standard tools and training entails adopting a standard OA methodology. By developing a standard set of tools, we can reduce the workload of the OA teams' chiefs by eliminating the need to develop and maintain their own tools. Further, we could link a standard set of tools to the backbone of JAOC software—Theater Battle Management Core Systems or its successors—potentially automating much of the data-collection effort. Currently, the collection and input of relevant data make for a very labor-intensive process for OA teams, reducing the time they have for interacting with the strategy division during development and refinement of courses of action. Additionally, each team requires augmentation during contingency operations. A standard OA methodology would enable us to provide initial qualification training for OA augmentees, minimizing the "pickup game" approach to assessing operations. This training would certainly incorporate the use of a standardized tool set, enabling deployed OA team members to contribute to strategy and assessment quickly during contingency operations.

Initially, future research efforts should focus on methodology. Any assessment faces the problem of missing data—a major issue addressed by many existing statistical approaches. JAOCs can exploit these techniques to enable better assessments. Gaining insight into causal

linkages, during both planning and execution, is a growth area for strategy and OA. Strategists often use the term *assumed causal linkages* because they develop them based on limited, often biased, understanding of the enemy system. By assessing operations according to the methodology described in this article, we could use the raw results to develop causal relationships between our performance and effect results. That is, we could correlate the completion of our tasks with the achievement of our desired effects. Further, we could employ numerous statistical techniques, such as canonical correlation, neural networks, and logistic regression, to add greater understanding to our causal linkages.   ❑

Notes

1. Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, 17 November 2003, 98, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd1.pdf.

2. Lt Gen David A. Deptula, "Effects Based Operations," *Air and Space Power Journal* 20, no. 1 (Spring 2006): 4, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj06/spr06/spr06.pdf.

3. J. P. Hunerwadel, "The Effects-Based Approach to Operations: Questions and Answers," *Air and Space Power Journal* 20, no. 1 (Spring 2006): 53–62; and Headquarters Air Force Doctrine Center, Doctrine Watch no. 26, "The Effects-Based Approach to Operations," 31 January 2007, https://www.doctrine.af.mil/Main.asp.

4. Air Force Instruction (AFI) 13-1AOC, vol. 3, *Operational Procedures—Air and Space Operations Center,* 1 August 2005, 14, http://www.e-publishing.af.mil/shared/media/epubs/AFI13-1AOCV3.pdf.

5. Ibid., 19.

6. Craig W. Kirkwood, *Strategic Decision Making: Multiobjective Decision Analysis with Spreadsheets* (Belmont, CA: Duxbury Press, 1997), 1.

7. Ibid.

8. John S. Hammond, Ralph L. Keeney, and Howard Raiffa, *Smart Choices: A Practical Guide to Making Better Decisions* (Boston: Harvard Business School Press, 1999), 4.

9. James Bradley with Ron Powers, *Flags of Our Fathers* (New York: Bantam Books, 2000), 135.

10. Glenn A. Kent, *A Framework for Defense Planning* (Santa Monica, CA: RAND Corporation, 1989), https://rand.org/pubs/reports/2006/R3721.pdf.

11. Ralph L. Keeney, *Value-Focused Thinking—A Path to Creative Decisionmaking* (Cambridge, MA: Harvard University Press, 1992), 100.

12. Kirkwood, *Strategic Decision Making*, 25. A thorough discussion of measurement theory lies beyond the scope of this article; however, interested readers can consult Maj Richard K. Bullock, "Theory of Effectiveness Measurement" (PhD diss., Air Force Institute of Technology, Wright-Patterson AFB, OH, 2006).

13. Robert T. Clemen and Terence Reilly, *Making Hard Decisions with Decision Tools* (Belmont, CA: Duxbury Press, 2001), 100.

14. Ibid., 610.

15. Joint Publication (JP) 5-0, *Joint Operation Planning*, 26 December 2006, III-13, III-60, http://www.dtic.mil/doctrine/jel/new_pubs/jp5_0.pdf.

16. Keeney, *Value-Focused Thinking*, 129.

17. Ibid.

18. Ibid., 56.

19. Ibid.

20. Ibid., 69.

21. For a cogent discussion of the characteristics of well-written objectives, effects, tasks, MOEs, MOPs, and success indicators, see Maj John J. Schaefer III and Maj Alan D. Kastner, "Operational Assessment of Effects Based Strategies: Proposed Approaches to Measurement Assessment in Effects Based Operations: Tools for Effects Based Assessment" (presentation, 12th International Command and Control Research and Technology Symposium, Hyatt Regency Hotel, Newport, RI, 19–21 June 2007), http://www.dodccrp.org/events/12th_ICCRTS/CD/html/papers/160.pdf.

22. Clemen and Reilly, *Making Hard Decisions*, 614–20.

23. Maj Kirsten Messer and Maj Shane Dougherty, "A New Operational Assessment Paradigm: Splitting the Stoplights," *Air and Space Power Journal* 20, no. 3 (Fall 2006): 65–68, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj06/fal06/Fal06.pdf.

Education in Intelligence, Surveillance, and Reconnaissance beyond the "Green Door"

Lt Col Jeff S. Hinrichs, USAFR

COUNTLESS PUNDITS HAVE accentuated the importance of intelligence in the aftermath of the terrorist attacks of 11 September 2001 and Operation Iraqi Freedom. Broadly speaking, a strategy-to-task intelligence, surveillance, and reconnaissance (ISR) transformation effort is under way to more effectively assess the accelerated threats of this new geopolitical landscape. However, with the spotlight squarely on ISR's significance, current and future strategic leaders outside the proverbial "green door" know little about ISR and what it can or cannot do. Strategic leaders must formally emphasize education in joint ISR as part of the professional development of senior leaders, and they can find a perfect avenue through the Intelligence Directorate (IN) of the newly formed Air Force Doctrine Development and Education Center (AFDDEC) at Maxwell AFB, Alabama.

Background

"This ideological struggle of the 21st century will require . . . good intelligence."[1] More reflective than prophetic, President Bush's comment suggests what he and many strategic leaders have been professing, namely that ISR must transform to meet today's challenges. Indeed, ample guidance on strategic ISR—ranging from the *National Intelligence Strategy* to directives issued by the Office of the Director of National Intelligence and the Office of Deputy Chief of Staff for ISR (Headquarters USAF/A2)—promulgates ISR's value. Bluntly put, there is no shortage of directives *for intelligence professionals* that define ISR or indicate where it should go. However, for individuals "beyond the green door," it is an entirely different story.

Educating future senior leaders *outside the intelligence community* about ISR within the context of the global war on terror (GWOT) has become lost in translation. "Most [non-intelligence officers] have a lot of misconceptions of things we can't do or things we can do, and most don't understand how ISR has changed to fight the [GWOT]."[2] This poignant statement comes from a senior intelligence officer in the field who drives the point further: "If an F-16 or F-18 is weather or [maintenance] canceled, no one notices. If an ISR platform is so much as delayed, it is a 2-star level issue in about 60 seconds."[3] Certainly, ISR education could help. However, authoritative guides that dictate curricula for senior developmental education in joint professional military education (JPME) do not specify a need for ISR education.[4]

Despite this shortcoming, AFDDEC/IN provides ISR education to current and future senior officers through developmental-education electives and national-level war games. Though only a small slice of the overall JPME pie, Air University (AU) touches over 2,000 current and future senior officers through its JPME programs. Further, it hosts these officers as a captive audience for an extended period of time. As part of AU, AFDDEC/IN is the only organization in the Air Force that can reach this number of joint senior leaders with ISR

education. Without formal strategic guidance on such education, however, it must forge ahead with curricula loosely tied to ISR inferences hidden within the authoritative JPME guides.

Analysis

ISR *education* transformation is not ISR *training* transformation. The issue at hand does not involve training those outside the intelligence career field to become ISR professionals. To the contrary, the transformation of ISR education in this context represents a functional awareness on the part of nonintelligence leaders (i.e., what ISR can or cannot do for them). The extent of their deficiency in understanding ISR requires further analysis, but one assumes that they do not possess "sufficient" awareness to wield the most effective operational or strategic art.

One may also infer that the dearth of JPME guidance has caused the lack of ISR understanding outside the ISR profession. Although culture, complexity, and parochialism may contribute to the problem, one may truthfully say that guidance on ISR JPME simply does not exist. Some individuals think that ISR curricula would come at the expense of other specialties or not meet the thresholds of JPME requirements. Whatever the reasons, the facts remain that some degree of ISR misunderstanding exists, a condition exacerbated by the lack of strategic guidance for ISR JPME (notwithstanding strategic leaders' profession that ISR is central to the GWOT). Infusing ISR into JPME could only positively affect the situation.

Within the context of the Air Force's JPME, AFDDEC/IN finds itself in a great position to champion an institutional paradigm shift in JPME ISR. However a number of factors will ultimately determine the fate of any effort to transform ISR education.

AFDDEC/IN could inform senior leadership of the problem. Communicating the issue through its chain of command at AU, Air Education and Training Command (AETC) could request that the Air Staff lobby for a change in ISR JPME at the Joint Staff level. However, this normalized approach carries one notable risk: nonintelligence commanders through the chain could debunk the necessity or urgency for organizational change in ISR JPME. Despite the risk, AFDDEC/IN must use its chain of command. However, requesting that AETC *own* the issue may not be necessary.

Alternatively, with the chain's permission, AFDDEC/IN could take the issue directly to Headquarters USAF/A2. Unlike AETC representation, that headquarters serves as the Joint Staff authority that would approve the transformation of ISR education. Directly requesting its sponsorship entails a lower risk of rejection than asking AETC to carry the ISR torch. Regardless, the risk remains that Headquarters USAF/A2 might not view the transformation of ISR education as necessary or urgent. Using the chain of command may seem obvious, but determining who sponsors organizational change in ISR JPME is no trivial matter when one considers its ultimate success.

To increase the chances for success, AFDDEC/IN could do more than petition a cause by revealing a problem; it might consider a broadly outlined solution. As noted, an ISR JPME elective and war-game curriculum, already in existence, touches thousands of nonintelligence leaders annually. Analysis-based statistical data highlighting deficiencies in nonintelligence personnel's awareness of ISR may further help identify specific curriculum topics. Regardless, AFDDEC/IN should hone a general ISR curriculum with a simple theme of "what ISR can and cannot do." Finally, details are important, but specific tenets of the ISR curriculum most likely will transform as ISR evolves in the rapidly changing environment. Nevertheless, AFDDEC/IN must consider a suggested curriculum that directly transforms ISR education.

Convincing senior leadership of a problem in ISR awareness may prove easier than fighting for formal senior-level guidance regarding ISR JPME. Sponsors from across the Department of Defense can nominate up to 10 special areas of emphasis annually for formal inclusion in JPME.[5] Aside from the laborious nomination/approval process, functional specialties such as ISR rarely "make the cut." Furthermore, the nomination of ISR in this case

must compete against other areas and specialties. Though existing special areas of emphasis within the guides suggest the importance of ISR, approving an ISR-specific requirement—though difficult—would formally direct the development of ISR JPME in the following academic year.

Apart from the formal pursuit of transforming ISR education, AFDDEC/IN could also redefine its newly merged role to further the case of ISR JPME. It has an unprecedented opportunity to seize upon the former Air Force Doctrine Center's reputation as the foremost authority on doctrinal thought. Mentoring its personnel to lead this charge, AFDDEC/IN could position itself as an institution of excellence to which leaders of all backgrounds go for ISR answers. One risk is that this process would take time and might do little to address the immediate need for enhanced ISR awareness outside the intelligence community. Further, redefinition does not address one contributing factor to the problem: lack of strategic guidance for ISR JPME. As a vision, however, such reflective thought could only improve the future quality of ISR JPME.

Though remote, there is a chance that AFDDEC/IN redefinition could make a direct impact on ISR JPME within AU. Armed with a transformed reputation, at the collegial level, it could present the ISR awareness problem to AU faculty leadership and request formal ISR representation in the core curriculum. Based on past experience, objections would likely center on competing course requirements as well as the absence of formal ISR references in the authoritative JPME guides. In the future, however, if faculty leadership perceives AFDDEC/IN as having greater authority, new opportunities for ISR JPME may arise. Whatever the perceptions, AFDDEC/IN redefinition could positively affect ISR JPME now.

Conclusions/Recommendations

Undoubtedly, ISR is fundamental to fighting the GWOT. Unfortunately, anecdotal evidence suggests that military personnel beyond the green door do not possess adequate ISR awareness to fight our nation's new war effectively. Although several factors may contribute to the problem, lack of strategic guidance for ISR JPME remains a key culprit. AFDDEC/IN must alert strategic leadership to the problem and request formal JPME direction.

Ultimate success will hinge on whether or not AFDDEC/IN can convince Headquarters USAF that a problem exists with ISR awareness and then solicit top-level sponsorship of the issue. The most promising choice calls for approaching Headquarters USAF/A2 directly; relying on AFDDEC/IN to redefine itself would take too much time, given the immediacy of the issue. Without top-down support, however, the transformation of ISR education will have to rest on the inadequately authoritative shoulders of AFDDEC/IN—an unacceptable choice for today's new world. ❑

Notes

1. Pres. George W. Bush (address, Reserve Officers Association, Washington, DC, 29 September 2006).

2. Col Kimberly B. Sievers, Air University, to Col Ronald Bartley, AFDDEC/IN director, e-mail, 11 April 2007.

3. Ibid.

4. Adm E. P. Giambastiani, acting chairman, Joint Chiefs of Staff, to chief of staff, US Army; chief of naval operations; chief of staff, US Air Force; commandant, US Marine Corps; and president, National Defense University, memorandum, 15 February 2007.

5. Ibid.
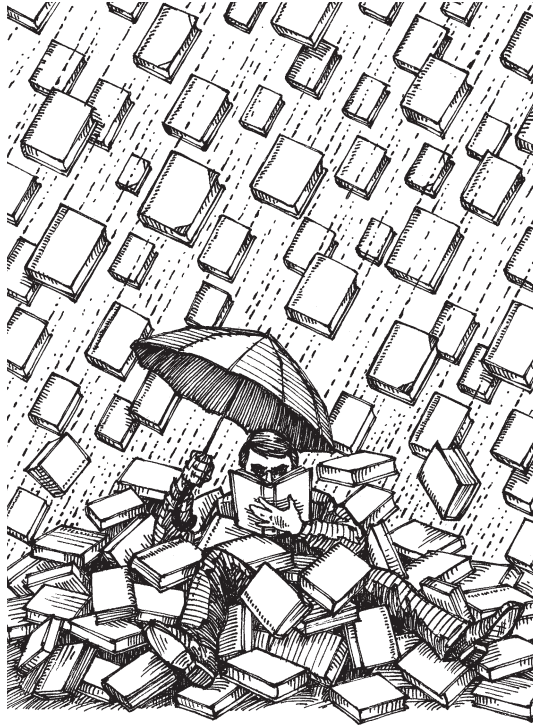
Lean Thinking: Banish Waste and Create Wealth in Your Corporation, revised and updated by James P. Womack and Daniel T. Jones. Free Press (a division of Simon and Schuster) (http://www.simonsays.com), 1230 Avenue of the Americas, New York, New York 10020, 2003, 400 pages, $30.00 (hardcover).

In their superb book *Lean Thinking*, James P. Womack and Daniel T. Jones offer hard-hitting, practical principles on banishing waste and improving productivity in organizations. Success for the leader is the ultimate destination, and that depends on the tools we bring with us. *Lean Thinking* will help leaders develop the skills they need for a successful journey in combating waste. As defined by Womack and Jones, "lean" involves the ongoing elimination of unnecessary, non-value-added steps within a process, which contributes to bottom-line results, increased competitiveness, and improved levels of customer service. As prescribed in this

book, lean thinking offers a way to make work more satisfying and challenging by providing regular feedback on efforts to convert waste into value. Differing noticeably from the recent emphasis on process and organizational reengineering, lean provides a way to create a new methodology and design for work rather than just destroying jobs for the sake of achieving efficiency. A classic, this book serves as a map, guide, and manual on how to create real, lasting value in any organization. In several respects, *Lean Thinking* is relevant to Air Force Smart Operations for the twenty-first century since it addresses continuous process improvement and makes sense of the concept and practices of lean. A powerfully compelling aspect of the book is that it strategically considers not only how to think of lean but also what to think of it.

The authors have written a timely, intelligent, and comprehensive text that addresses provocative ideas for driving greater efficiency in eliminating waste. Their innovative strategy encompasses initiatives touching all of an organization's business functions and processes. They correctly argue that waste is the enemy. In their judgment, to consume, spend, or employ uselessly or without adequate return is dysfunctional, counterproductive, and potentially devastating to any activity. It is obvious to the reader that the more savings we achieve, the more committed we become to finding even more opportunities to further improve the way we do business and generate additional savings. If companies wish to survive, continuous improvement in reducing waste must become a priority organizational value. This is a clear imperative in any highly competitive global environment. The authors contend that practitioners who have a passion for improving the way they operate need a simple-to-read and simple-to-use source, coupled with improvement strategies that bring usable tools to the workplace. By correctly utilizing these methods, and providing proper leadership and commitment, they can make a major difference in the conduct of work.

Appearing on *Business Week*'s best-seller list of business books, *Lean Thinking* consists of four interrelated parts. Part 1, "Lean Principles," explains actionable principles for creating lasting value in any business venture. This requires a conscious attempt to precisely define product value, capabilities, and prices through a dialogue with customers. Applying these principles in a step-by-step process

necessitates close observation of the entire set of activities entailed in creating and producing a value-added product or service. Part 1 considers redefining the work of functions and departments within organizations, submitting that the reengineering movement has recognized that departmental thinking without a broader organizational vision can become one-dimensional and suboptimal. A key aspect of this involves employing the principle to shift attention from organizational categories (departments) to lean, thus value-creating strategic processes. It also speaks persuasively to lean metrics by analyzing profiled companies that have successfully utilized lean thinking. Pointing to Toyota as their leading exemplar of lean, the authors carefully explain the mechanics of why that company has achieved real and sustainable value for its customers, employees, and the company itself. Key elements of Toyota's success concern production methods, product distribution, uses of technology, car service, and a highly effective business cycle. But omitted from this list, as elsewhere in the book, is the role of the leader and leadership as opposed to management. Books of this type should encourage a better balance between these two concepts. This reviewer holds that the practice of lean must address how organizations can free their people from time-consuming activities to enable them to have more opportunity to implement the processes cited in *Lean Thinking*. Much of the potential of this type of reflection disappears unless one grasps the realities of each aspect of part 1. Labeled "perfection," this portion of lean stresses the careful integration of all the concepts cited within part 1. By seriously considering and holistically implementing these ideas, one can make significant advances in getting lean thinking "right."

The message in part 2, "From Thinking to Action," is both simple and profound—the mark of deep experience. Acting on the belief that the true end of thought is action, the authors show how to apply the principles addressed in part 1, doing so not with any idealistic notions but in a step-by-step, businesslike approach, considering both large and small companies. Like readers of *Alice in Wonderland*, we learn from it according to the background we bring to the reading. Relying on a variety of case studies and experiences from the United States, Germany, and Japan, part 2 radiates lean's realistic and clear-eyed approach from thinking to action. Selected topics addressed include installing business systems to encourage lean thinking, teaching lean thinking and skills to everyone, creating a workable action plan, and being aware of costs at every level in any operation. The latter topic has particular relevance to lean in that today, in both government and business, no one has a blank check. Thus organizations must become significantly more effective and efficient (the central message in lean). Absent here and in other portions of the book, however, are the element of cultural change and its fundamental psychology—as well as ways to bring it about.

Part 3 optimizes the value created for the customer while minimizing time, cost, and errors. Entitled "Lean Enterprise," it portrays the need to focus intently on the customer. Correctly concluding that responsive customer relations account for most of the value perceived by customers, the authors recommend that firms conduct rapid analyses and then take fast-strike improvement actions to ensure they meet customer needs. This type of action requires total organizational support.

In part 4, the "Epilogue," *Lean Thinking* tracks trends in inventory and metric management. Looking to Toyota as an example, Womack and Jones have done some excellent work in capturing the basic process building blocks that contribute to the implementation of lean. Whereas many companies in the United States are rushing to manufacture in China, Toyota is bringing its cars and huge profit making to this country. General Motors is retiring over 50,000 employees, but Toyota is hiring. In Texas, Toyota received job applications from over 115,000 people for fewer than 2,000 positions. Why? Toyota simply gives its people respect, provides them a sense of value regarding what they do, and promotes organizational effectiveness.

In summary, *Lean Thinking*, which includes a good glossary, notes, bibliography, index, and contributions from a number of individuals, is an excellent book to keep on the shelf. Readers should study it carefully, particularly in group settings. In the study of lean, few other publications, if any, can equal it.

Dr. Richard I. Lester
Eaker College for Professional Development
Maxwell AFB, Alabama

The Future US Air Force by Min Zengfu [闵增富]. PLA Publishing House, no. 40 Di'anmen Xidajie Street, Xicheng District, Beijing, China, 2007, 318 pages, ¥22.00 ($3.00) (softcover).

How does the Chinese military view the US Air Force (USAF)? *The Future US Air Force*, recently

published by a Chinese senior colonel, may provide the answer.

The author divides his book into nine chapters. The first two, "Roadmap Leading to the Future USAF" and "Military Transformation as Seen by the USAF," serve as background descriptions. They tell how the objective of "Global Reach and Global Power," put forth in 1990, evolved into "Global Vigilance, Reach, and Power" in the USAF document *Air Force Vision 2020* (2000). The author agrees that *Vision 2020* is much more detailed and executable because it now specifies six core capabilities necessary for fulfilling the general objective.

Against this background, the following five chapters focus on key aspects of building the future USAF: force organization and structure; doctrines and plans; key capabilities and technologies; weapons; and the future battlefield and force deployment. Readers will appreciate the author's painstaking effort in creating this framework, which greatly facilitates an understanding of future USAF objectives.

Not only is the framework noteworthy but also the contents prove informative and insightful. Chapter 3 discusses why the USAF restructured its forces into nine major commands as well as 18 numbered air forces after the first Gulf War. The author contends that this new force configuration serves the USAF's global mission much better and will remain unchanged for a relatively long period.

Chapter 4 discusses the development of USAF doctrines and operational plans, describing how Col John Warden's five-ring system theory—as well as derivative theories, such as parallel operations and effects-based operations—influenced the planning and execution of Operation Allied Force in Kosovo and various operations in the ongoing war in Iraq. The author points out that through adapting itself, the current and future USAF will feature three force types: basic forces, special task forces, and mobility forces, all designed to execute future operations ranging from command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR), to global strike, global mobility, homeland security, global reactive strike, and nuclear operations.

Chapters 5 and 6 provide in-depth discussion on the key capabilities, critical technologies, and advanced air and space weaponry needed for developing the future USAF. Their content may be familiar to some US audiences but will surely attract many Chinese readers thirsty for such exciting information.

The USAF differs from most other air forces in that it flies not only in the air but also more and more in space. This trend has certainly not gone unnoticed. Chapter 7 asserts that the USAF now clearly regards air and space as one seamless battlefield and has begun building and deploying its forces to cover the airspace vertically, all the way into deep space, and horizontally, over every corner of the globe. One can easily find the book loudly echoing the famous speech by Gen John Jumper, former USAF chief of staff: "Let me be perfectly clear—in our Air Force, every Airman is expeditionary."

Chapter 8 examines the risks involved in Air Force transformation and ways of measuring its success. Readers who do not have time to read the entire book may want to skip this chapter but should not miss the final one—"Revelations from USAF Transformation." Here, the author does a wonderful job of comparing the USAF with its counterpart in the former Soviet Union and present-day Russia. Although his admiration of the USAF is obvious, he is somewhat critical of the force structure of the Russian Air Force. Specifically, the author believes that the integration of air, space, air defense, and strategic forces under the USAF is a much more farsighted and far-reaching solution in terms of efficiency, budget control, utilization of resources/assets, and joint operations than the Russian command structure. However, he stops short of mentioning the fact that, in China, the Second Artillery Force is also a separate service. Nevertheless, he does poignantly state that "the strategic missile force does not have its own battle space [and] therefore lacks the sufficient basis of becoming a separate service" (p. 315).

This book of more than 300 pages depicts a clear picture of how the USAF, guided by the road map of *Air Force Vision 2020,* is fast becoming a truly expeditionary force while gradually shifting from an air-centric focus to a space-centric one. Readers may not find much discussion in the book about a third equally important battlespace—cyberspace. But we should not blame the author since the USAF added cyberspace to its mission statement only recently; even today, its definition remains the subject of debate.

A top-class Chinese military researcher, Sr Col Min Zengfu has published several influential books and more than 100 articles/monographs. The sheer volume of publications speaks to the breadth and depth of his knowledge. *The Future US Air Force* is his latest addition but certainly not the last. The author notes in the foreword that "this book is intended for those who want to get a glimpse of the future US Air Force." By many measures, it fulfills that purpose.

Guocheng Jiang
Maxwell AFB, Alabama

Blood on German Snow: An African American Artilleryman in World War II and Beyond by Emiel W. Owens. Texas A&M University Press (http://www.tamu.edu/upress), John H. Lindsey Building, Lewis Street, 4354 TAMU, College Station, Texas 77843-4354, 2006, 160 pages, $24.95 (hardcover).

I'm continually drawn to memoirs of men who fought in World War II. To me, reading about their experiences and recollections is infinitely more interesting than the cold facts and bland rehashing of unit movements and battle progressions. When authors can tie such an important part of their lives to a historical event, it makes that situation much more memorable. In other words, I love reading memoirs. Let me rephrase that: I love reading "most" memoirs.

In *Blood on German Snow,* the author gives us insight into the life of a black soldier fighting against the forces of Nazism in Europe during a time in our history marked with decidedly dark undercurrents. Emiel W. Owens is an interesting man whose life shines with the academic achievements that most people can only dream about. Holding a PhD in economics from Ohio State University, he has taught and lectured around the world, including Europe and Africa. His life after the war makes for a compelling study in itself.

Born in the small town of Smithville, Texas, in 1922, Owens grew up in the usual, repressive Jim Crow environment found throughout the South. Due to the influence of his family, however, he obtained an excellent education. His love of learning and academic achievement stayed with him his entire life. In 1943 Owens was drafted into the Army, where he became part of the segregated 777th Field Artillery Battalion, in which he served throughout the European conflict.

Regarding *Blood on German Snow* as a memoir, I have to say that in some ways it disappointed me. One would expect much more discussion of the author's contributions and experiences in combat. This book reveals that he had many of them. That is not to say he doesn't relate any of these stories, but only 57 pages cover the actual fighting in Europe. This includes his initial arrival on the continent through the German surrender. Although the author's unit took part in the deadly fighting inside the Hurtgen Forest in November 1944, for example, one finds surprisingly little detail about the fighting. Therefore, readers searching for a black artilleryman's memoir that gives detailed descriptions of artillery operations in the European theater of operations should look elsewhere.

That being said, *Blood on German Snow* does offer the reader a look into an obviously sensitive man and some of his wartime recollections. His vivid descriptions of the deaths of comrades and of German civilians caused by his artillery make apparent the fact that he would rather forget the details of "his" war. Similarly, Owens gives us a glimpse of a man finally coming to terms with dealing with nonblacks in a significant manner for the first time in his life. I found one anecdotal story amusing. In April 1945, the author was walking when, without any sound, something hit the ground right in front of his feet, splashing mud over his body from head to toe. When he looked down, he saw that it was an unexploded German 88 mm shell. Immediately afterward he went to a rest camp in Belgium for a week to regroup. Such are the fortunes and luck of war.

Although the book includes 22 photographs and three maps, it leaves the reader wanting more of Owens's combat experiences to balance out his pre- and postwar endeavors. As a significant historical contribution, this book leaves me sitting squarely on the proverbial fence. It does give the reader a look into the contributions of black combat soldiers—a facet of World War II generally ignored. It also illustrates one man's desire to excel in all endeavors and aspects of his life. Without a doubt, the author succeeded as a man, a father, and an educator. But at a rather steep $24.95, *Blood on German Snow* is a hard sell. Do I recommend reading it? Yes. An easy read, it will give people insights they probably haven't experienced before. Would I consider this a significant historical contribution? Although I found it interesting, the author's lack of commitment to wartime details makes *Blood on German Snow* fall just a bit short of my expectations of a "wartime memoir."

Lt Col Robert F. Tate, USAFR, Retired
Montgomery, Alabama

LeMay, Great Generals Series, by Barrett Tillman. Palgrave Macmillan (http://www.palgrave-usa.com), 175 Fifth Avenue, New York, New York 10010, 2007, 224 pages, $21.95 (hardcover).

The cover of my advance copy of *LeMay* proclaims it the "First Major Biography" of the sixth chief of staff of the Air Force and the second commander of Strategic Air Command (SAC). A major biography it certainly is *not*. Its brevity alone disqualifies it for that designation. The research is superficial, dealing primarily with the most com-

mon published sources. Twenty of the first 35 citations come straight out of LeMay's own *Mission with LeMay: My Story* (1965) (with MacKinlay Kantor). Nothing in the current work would prove objectionable to the authors of that volume or to LeMay's heirs. Barrett Tillman has published 40 books, mostly for the popular market. His writing is good, but the depth of his research is minimal. Stuffing the story of the life of a major actor in so much of our air history (including World War II, Korea, and Vietnam) into such a short narrative is out of the question.

As noted, *LeMay* is very conventional in its interpretations. It might be suitable for Junior ROTC students but not for the readers of this journal. Rather, they should turn to LeMay's own *Mission with LeMay: My Story*; Tami Davis Biddle's *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1914–1945* (2002) (on strategic bombing up to Hiroshima); Harry R. Borowski's *A Hollow Threat: Strategic Air Power and Containment before Korea* (1982) (for the initial weakness of SAC); and Walton S. Moody's *Building a Strategic Air Force* (1996) (on LeMay's work in rebuilding SAC). The author also relies heavily on Thomas M. Coffey's *Iron Eagle: The Turbulent Life of General Curtis LeMay*—not a definitive biography but certainly a better source than Tillman's.

I recommend that you *do not* use up space on your professional reading list for Tillman's concise summary.

Dr. David R. Mets
Maxwell AFB, Alabama

Winged Defense: The Development and Possibilities of Modern Air Power—Economic and Military by William Mitchell. Dover Publications (http://www.doverpublications.com), 31 East 2nd Street, Mineola, New York 11501-3852, 2006, 320 pages, $9.95 (softcover).

In their book *The Dynamics of Military Revolution, 1300–2050* (Cambridge: Cambridge University Press, 2001), editors MacGregor Knox and Williamson Murray observe that revolutions in military affairs require the assembly of a complex mix of tactical, organizational, doctrinal, and technological innovations to implement a new conceptual approach to warfare or a specialized subbranch. William Mitchell's book *Winged Defense*, originally published in 1925, reads as a smartly articulated, remarkably detailed, passionate, and persuasive argument for the US government and military leadership to recognize airpower as a necessary revolution in military affairs with monumental economic application: "Those interested in the future of the country, not only from a national defense standpoint but from a civil, commercial and economic one as well, should study this matter carefully, because air power has not only come to stay but is, and will be, a dominating factor in the world's development" (p. 119).

Mitchell emphatically expressed that America needed to embrace airpower as a primary means of national defense and deterrence of aggressors through the establishment of an independent US Air Force: "Our development must be based on the grand hypothesis that future contests will depend primarily on the amount of air power that a nation could produce and apply" (p. 31). His comprehensive understanding and articulation of the required force and equipment structure, support infrastructure, aircraft capabilities and employment tactics, training, maintenance, role of government in financing design development (based on capability needs), manufacturing of aircraft, and so forth were incredible, reflecting sheer visionary genius. Emphasizing the value of airpower's speed, he also saw the economic value of air transport, noting the numerous commercial roles that airplanes would eventually play in transporting goods and providing services for businesses and consumers as well as federal, state, and local governments.

At that time, many people considered his thinking regarding the role of airpower too futuristic, radical, possibly self-serving, and controversial to be taken seriously. However, he proved through recorded exhibitions that emerging airpower capabilities had a distinct strategic advantage over conventional stand-alone ground and naval forces. Furthermore, Mitchell argued that this advantage would widen, making the United States vulnerable to attack. In retrospect, his clarity of purpose, vision, and strong conviction—while others wandered lost in the myopic fog of the time—was uncanny. Acting on concerns of risking service reliance and obsolescence, the Navy and War Departments eventually embraced airpower in fighting future wars by developing the Navy carrier and Army Air Corps. This adaptation led to great successes during World War II. Subsequently, Mitchell's notion of an independent Air Force would come to fruition.

His vision of airpower proved prophetic and an unparalleled instrument for change in military defense and economic activities. His unwavering, single-minded advocacy of the importance of airpower and the lead role he insisted the United States play in its development and application culminated in

an unrivaled, cutting-edge air and space industry that has become the envy of the world.

Arguably no American was more instrumental in promoting the development and use of airpower than Billy Mitchell. *Winged Defense* remains a premier aviation classic and a must-read for all service and commercial aviators. Logisticians, military historians, entrepreneurs, economists, leaders of all types, and those interested in the power of ideas will find this book valuable.

Dr. David A. Anderson, Lieutenant Colonel, USMC, Retired
US Army Command and General Staff College
Leavenworth, Kansas

Political Handbook of the Middle East, 2006. Congressional Quarterly (CQ) Press (http://www.cqpress.com), 1255 22d Street, NW, Suite 400, Washington, DC 20037, 2006, 452 pages, $125.00 (hardcover).

Neither a light read nor a work of fiction, *Political Handbook* is a comprehensive work of detailed documentation on the political background of countries commonly considered as comprising the Middle East. Basically a textbook, it offers ready access to information concerning the political foundation, background, evolution, and current status of this region. The book's wonderful introduction sets the stage for the detailed material to follow and gives the reader a taste of the crisp writing style found throughout. At the end of the book, one finds a treasure chest of useful facts on such important international entities as the Organization of Petroleum Exporting Countries, United Nations, Arab League, and Palestine Liberation Organization, to name a few.

Its real value, however, lies in the body of the work, which offers detailed descriptions of the political organization of Middle Eastern countries. For each of the selected 25 nations, the study examines "The Country" (a historical look at its political formation); "Government and Politics" (a view of the political background and issues that molded the country, including a consideration of its constitution and government structure); "Current Issues" (what has recently [within the last five years] occurred in the political realm—in other words, what captures the interest of the current government); and "Political Parties and Groups" (a composite snapshot of dominant political organizations). Furthermore, sections on "Legislature," "Communica-

tions," and "Intergovernmental Representatives" identify current incumbents.

The publisher, CQ Press, has put its vast resources to good use in producing this worthwhile book. I recommend it to the serious student of regional studies, the individual who wants to know what has caused the current situation in this region, and the general reader who desires a deeper appreciation for news about that area of the world. *Political Handbook* would make an excellent addition to their professional libraries.

Col Joe McCue, USAF, Retired
Springfield, Virginia

What Terrorists Want: Understanding the Enemy, Containing the Threat by Louise Richardson. Random House Publishing Group (http://www.atrandom.com), 1745 Broadway, 18th Floor, New York, New York 10019, 2006, 336 pages, $25.95 (hardcover).

Amongst the hundreds of books about the nature of terrorism, its causes, and the motivations of terrorists, *What Terrorists Want* provides a unique and absorbing perspective on how these aspects interact and influence the United States' challenges in the international-security environment. The book is a historically based survey of various terrorists, groups, and their motivations, including examples from nineteenth- and twentieth-century anarchists, Cold War–era nationalist and postcolonial movements, and the post-9/11 environment, laced with religious fervor and increasingly lethal means. The author, Dr. Louise Richardson of Harvard University, begins part 1 of *What Terrorists Want* with a well-organized and insightful analysis of individual terrorists and groups. Part 2, also effective and interesting, includes rather controversial recommendations on existing strategies and tactics that are working—and failing. All in all, this book is an engaging study that enables the reader to better consider policy options and assess shortcomings in the continuing and evolving global war on terror (GWOT).

Raised in the 1960s and 1970s in rural Ireland, the author describes the emotional appeal of Irish patriots along with the emotional dissonance created by British tactical and strategic missteps and blunders in attempting to defuse the often-violent Irish independence movement. Her technique lays the foundation for a sense of empathy (if not sympathy) for understanding why moderates and main-

stream Catholics came to tacitly support or join the "activists' " cause, despite their methods. Dr. Richardson does an excellent job of conveying the logic of those who feel they have no choice other than standing up to perceived injustices perpetrated upon the persecuted, and she shows linkages between how they create, build, and maintain support from a wider community.

In part 1, Dr. Richardson extends her reflections and analysis to causes and trends in current transnational terrorism. She extracts her conclusions not only from her early experiences but also from her work in terrorist studies. In describing the dynamics of what motivates Islamic radicals (focusing on Osama bin Laden and al-Qaeda), "revenge, renown, and reaction" emerge as driving forces that energize and perpetuate the use of terrorist techniques more generally. One of the unique insights of Dr. Richardson's argument suggests that these groups, unable to defeat their enemies outright, derive maximum benefit by humiliating them. Humiliation has become a source of power and perpetuation for their cause by enabling them to attract new recruits, cause political concessions, and withstand violent and catastrophic losses to their infrastructure. In fact, she convincingly shows how using terrorist actions to provoke state actors into violent reactions helps accelerate and sustain these groups and their agendas.

Thus, Dr. Richardson seems to reassert a rather well-known or at least intuitive theory: state actions can often provide fuel to the terrorist fire. But she both enhances and extends the credibility of this common assertion—not by blaming the United States for 9/11 but by showing how suicide terror is part of a fabric of social conflict and resistance to perceived injustices of a merciless and overwhelming enemy. One question, where do the terrorists "get the social support they needed to sustain them?" (p. 134), marks the transition from part 1 to part 2 of *What Terrorists Want*, wherein she addresses counterterrorism, losing some momentum as she analyzes what has and has not changed in the nature of terrorism after 9/11. Some of her thoughts are controversial, including assertions that al-Qaeda does not have foreseeable, credible access or sufficient will to employ weapons of mass destruction. Also, she places less focus upon the inherent corruption and bankruptcy in some of the societies that provide the breeding ground for radicalized groups. Meanwhile, she spends a great deal of time discussing the hubris and self-serving agenda of American and other Western foreign policies.

However, Dr. Richardson finishes strongly by associating how and why these behaviors can create self-defeating results, undermining long-term success. As she states, "The urge to declare war in response to atrocity . . . is very understandable. I have argued, however, that it is also very unwise" (p. 199). Her recommended approach is to disrupt the cycle of "revenge, renown, and reaction" by starving-off and making irrelevant the leadership and vision provided by today's Islamic radicals. This implies deemphasizing direct force, public displays of American pride, and overt support to certain friends and allies. Her concluding chapter makes a number of recommendations familiar to anyone who has read the *National Strategy for Combating Terrorism* (2003) or various Department of Defense counterinsurgency documents and counterterrorist doctrine. They include separating terrorists from their communities, knowing one's enemy, setting achievable goals and establishing alliances, and cooperating in the international community.

Despite concluding with these generic and pedestrian policy recommendations, which one can question as idealistic or impracticable, *What Terrorists Want* is a timely, interesting, and useful read. Dr. Richardson's style is direct and easy to synthesize. Her ability to bring personal experience into the story and to convey a sense of perspective from the radicals' point of view makes this book work. It gives the reader a sense of how US strategy and behavior operate in the cycle of terrorist behavior. Although the author seems strident in her critique of US foreign policy at times, her provision of a framework for understanding how terrorists think and what they want will enhance any military officer's comprehension of US effectiveness in the continuing GWOT.

Lt Col Chris Eisenbies, USAF
Air Force Fellow
University of Illinois–Champaign-Urbana

Information Age Transformation: Getting to a 21st Century Military by David S. Alberts. Department of Defense Command and Control Research Program (http://www.dodccrp.org), Washington, DC, 2002, 145 pages. Free download available from http://www.dodccrp.org/files/Alberts_IAT.pdf.

Information Age Transformation offers a thoughtful look at challenges to the Department of Defense (DOD) as it incorporates the ongoing revolution in information technology. The book's author, Dr. David Alberts, director of research for the assistant secretary of defense, has published or coauthored

multiple books on command and control (C2) and technology topics. This book is a rewritten and updated version of his study *Unintended Consequences of Information Age Technologies* (1996). In that National Defense University publication, Alberts argues for an effective DOD technology-insertion strategy to maximize the positive contributions of the information revolution and the evolution to an "Information Age organization" (p. 2). *Information Age Transformation* updates terminology and combines the themes of network-centric warfare (NCW) with recommendations on how to think about and accommodate change, specifically changes brought on by improved information flows.

Dr. Alberts expresses his concern that we have not given enough consideration to all aspects of incorporating new information capabilities. In his opinion, factors such as organization and training often receive short shrift while the material aspect of the technology itself receives the lion's share of attention. Identifying the military's concept of C2 as one of the greatest roadblocks to fully exploiting new capabilities, he suggests a process of consultation, collaboration, and convergence as an optimum C2 model for fully exploiting the information age, particularly in a joint and combined environment.

Information Age Transformation contains a brief recap of the DOD's publications and some still-unanswered questions about the information revolution, followed by a collection of the author's thoughts on the best way for the department to exploit opportunities yet avoid adverse consequences. The book makes the significant proposition that the onslaught of new information-age technologies will revolutionize military organizations and the very concept of command (p. 49). Although Alberts touches on a significant number of NCW issues, he does not offer a list of recommendations so much as he conducts a philosophical exercise to allow leaders to appreciate conditions needed to take advantage of opportunities and avoid pitfalls of greatly improved information sharing in military operations.

One can clearly appreciate the author's vision of an information-rich future in which every military element has access to an endless sea of data/awareness and can employ a collaborative-and-convergence approach, versus a C2 system, leading to an all-knowing, "self-synchronizing" force (p. 40). This transformed military may have given rise to the quick victory against Iraq's military in 2003. The means by which these information-technology transformations enhance phases of military operations before and after major combat operations has not proven as obvious. I wonder if any information system or command paradigm can compensate for the challenge of identifying quality information from the outset.

Information Age Transformation does examine issues associated with "the quality and distribution of information within the organization—its richness, its reach, and the quality of the interactions" (p. viii). The author's observations regarding information flows and the impact on organizations are instructive, as are his recommendations regarding experimentation—the need for integrated planning and a more holistic approach to acquisition and integration. As a review of some of the issues the DOD faces as it struggles to incorporate all the potential of the information age, Dr. Alberts's short book would appeal to department members engaged in experimentation, test and evaluation, and the design or acquisition of C2 systems.

Col Darren D. Medlin, USAF
Air Force Fellow
Santa Monica, California

With God on Our Side: One Man's War against an Evangelical Coup in America's Military by Michael L. Weinstein and Davin Seay. St. Martin's Press (http://www.stmartins.com), 175 Fifth Street, New York, New York 10010, 2006, 272 pages, $25.95 (hardcover).

While conservatives dominate talk radio and liberals now make movie documentaries, anyone can write a book on a hot-button issue. For Michael "Mikey" Weinstein, a book must have seemed the next logical step in his continuing campaign to supply ingredients for more nationally reported headlines like those originating from the Air Force Academy over the last several years. Weinstein, of course, is the academy graduate who argues that evangelical Christian values were illegally pushed on cadets, including his two sons, who, like their father, are Jewish. He contends that the events at the academy are symptoms of a "creeping evangelism" in the military that violates both First Amendment rights and the "separation clause" between church and state. For Weinstein, the academy case serves as evidence for his broader charges of "systemic problems of religious bias and Constitutional neglect that continue to occur within the United States armed forces" (Gordon Lubold, "Religious Bias Complaint Filed with DOD IG," *Air Force Times*, 12 December 2006). In just over a year, Weinstein has filed suit against the Air Force and has organized and headed up a religious watchdog group—the Military

Religious Freedom Foundation—because of his perturbations over alleged improper evangelization.

So, if the reader is looking for a dispassionate, balanced investigative report to chronicle, explain, and analyze what occurred at the academy, this semiautobiographical volume is not it. Instead, this is "one man's war against an evangelical coup" (according to the dust jacket). Weinstein's campaign is a frontal assault on an institution that is not only his own alma mater but also one he saw fit to have his sons attend. As his coauthor informs us, Weinstein is an angry man: "His anger is never out of reach, foulmouthed explosions of bitterness are launched against the evangelical forces that sometimes seem to feed on the rancor he pours forth" (p. 209).

The release of the book in the fall of 2006 roughly coincides with the hearing of his litigation against the Air Force in federal court. With annexes offering selected official reports and documents to support his claims, it probably could have been filed with the court as the brief for his lawsuit (minus the invective).

Readers will likely find themselves distracted by several literary devices used by Weinstein and his coauthor. The flow of the story is frequently disrupted by a style that abruptly and awkwardly bounces in and out of Weinstein's first-person narrative and Seay's third-person narration. Their prose is also prone to bombastic alliteration. The reader encounters far too many sentences such as the following: "The 'Passion' [Mel Gibson's movie] had in short, become a promulgating powerhouse, and within the cloistered confines of the Academy its persuasive potential was given full sway" (p. 37).

More importantly, the largely professional and military audience ultimately interested in reading such a book, including many Air Force personnel with academy connections, may be put off by the author's self-adulation of personal and professional accomplishments that are routinely and commonly found among his likely audience. Just how many times can one pull off mentioning "He was a lawyer in the Reagan White House" to an already-overachieving group of lawyers, astronauts, engineers, test pilots, general officers, corporate executives, and other professionals?

Overall, the book is raw and biased, reflecting Weinstein's own angry views as a litigant against the Air Force and, by extension, the entire US military. For the future, his case also represents the opening salvo in a forced debate on the future role of US military chaplains, base chapels, and their programs—a role that is fundamentally at odds with today's model. Nevertheless, *With God on Our Side* is essential reading for someone seeking an understanding

of the stakes as well as the turbulent events that so closely followed in the wake of the academy's sexual-assault scandal. Ironically, the antithesis of Weinstein's case, now before the courts, is also making headlines. A military chaplain is suing the government, charging the military with violating his First Amendment rights by forbidding him to pray "in the name of Jesus" at public ceremonies.

Even though a federal judge dismissed Weinstein's suit in the fall of 2006, primarily on grounds that the plaintiffs didn't have "standing with the court" to file it (i.e., they weren't cadets anymore) and could not prove they were harmed, a sequel will undoubtedly appear. Weinstein may not write it, the setting will probably not be the Air Force Academy, and the case will likely stem from different circumstances.

As long as Americans remain divided over their understanding, let alone interpretation, of the important constitutional principles of First Amendment rights and the separation clause governing church and state relationships in the twenty-first century, divisive cases such as Weinstein's will unfortunately continue to appear.

Col Chris J. Krisinger, USAF, Retired
Burke, Virginia

Firestorm: The Bombing of Dresden, 1945 edited by Paul Addison and Jeremy A. Crang. Ivan R. Dee (http://www.ivanrdee.com), 1332 North Halsted Street, Chicago, Illinois 60622-2694, 2006, 272 pages, $16.95 (softcover).

Among the Dead Cities: The History and Moral Legacy of the WWII Bombing of Civilians in Germany and Japan by A. C. Grayling. Walker and Company (http://www.walkerbooks.com), 104 Fifth Avenue, New York, New York 10011, 2005, 320 pages, $25.95 (hardcover).

Moral questions regarding the use of force are often the toughest issues for practitioners and thinkers of warfare to face. Most military people recognize, at least on an instrumental level, the need for restraint in warfare; morality plays an important role if for no other reason than to provide a vision for how we ought to fight. Yet morality can be a tough taskmaster, leading to stinging critiques of our performance on the battlefield and forcing us to confront episodes of history that one might prefer to leave undisturbed.

Two recent works provoke that level of discomfort. Both *Firestorm,* edited by Paul Addison and Jeremy A. Crang, and A. C. Grayling's *Among the Dead Cities* take fresh looks at "area bombing" during the Second World War. In doing so, they force the reader to face up to the very real moral issues surrounding the use of airpower in this period.

Firestorm is an edited volume based on a colloquium held at the University at Edinburgh in May 2003 "to discuss the causes, the conduct, and the consequences of the bombing" (p. ix) of Dresden in February 1945. The contributors do not share one particular viewpoint regarding the event; in fact, the authors disagree at times on certain conclusions. But collectively they provide an important reexamination of the bombing of Dresden and the ways it "has come to symbolize the military and ethical questions involved in the waging of total war" (p. x).

The work offers a number of important contributions to the scholarship on Dresden. Richard Overy makes a compelling case, based on recently discovered primary sources, that the number of civilian casualties resulting from the raid was significantly less (approximately 25,000) than previously unsupported assertions by authors such as David Irving. Both Tami Davis Biddle and Sebastian Cox agree that the raids represented "business as usual" for both the Royal Air Force's (RAF) Bomber Command and the United States Army Air Force's (USAAF) Eighth Air Force. However, while Cox argues that Dresden was a militarily significant target, as a center of administration and communication as well as war industry, Sönke Nietzel maintains that the raid, in the end, produced no military advantage for the allies.

The contributors assert other, more disturbing, conclusions. Biddle makes the case that one of the Allied objectives for the Dresden raids was to create an obstacle, through the use of refugees, to hinder the German Wehrmacht's attempts to reinforce the Eastern Front against the approaching Soviet offensive. She also notes that, unlike what one might have expected to happen at the beginning of the war, no debate occurred amongst Allied war leaders about the use of civilian refugees for this purpose. Biddle attributes this lack of debate to "hardened attitudes" among the war leaders at this stage of a long and exhausting war, as well as their anxiety about the conflict's future direction in the immediate aftermath of the Ardennes offensive. Donald Bloxham contends that the bombing of Dresden was, in fact, a war crime: "Had an independent war crimes tribunal with full international jurisdiction been established in 1945, there would have been a strong *prima facie* case for it to consider the bombing [of Dresden] as a war crime" (p. 180). In doing so, Bloxham provides a thoughtful discussion on the principle of proportionality and airpower—that is, what is the balance between the hoped-for military advantage gained from area bombing on the one hand and the resulting civilian deaths and destruction of property on the other? All in all, this volume is an important addition to the literature on the use of airpower and morality in the Second World War.

In *Among the Dead Cities,* British philosopher A. C. Grayling takes a similar yet broader tack than Donald Bloxham's contribution in *Firestorm* by seeking to answer the question "Did the Allies commit a moral crime in their area bombing of German and Japanese cities?" (pp. 2–3). Unlike *Firestorm*, which focuses exclusively on the bombing of Dresden in February 1945, *Among the Dead Cities* casts a critical eye at area bombing throughout the war, including the USAAF's XXI Bomber Command's firebombing of Japanese cities starting in March 1945. In doing so, the book provides a passable synthesis of the history of the intellectual development of the RAF's bombing doctrine, as well as the history of Bomber Command in the Combined Bomber Offensive (CBO), but does not make any new contributions to the current understanding of the field. Grayling also scrutinizes British public dissent of the RAF's area-bombing campaign and makes a compelling case that the government was aware of the humanitarian impact of this policy. He also analyzes the arguments used in defense of area bombing. Grayling is to be credited for at least presenting these defenses; in some cases, however, he discounts generally effective arguments, such as Richard Overy's compelling line of reasoning about the CBO's overall impact on the German war effort.

Nonetheless, as rich, detailed, and nuanced as Grayling's moral argument is against Bomber Command's efforts in Europe, he fails to make a similarly strong case against the USAAF's efforts in the Pacific. In fact, the disparity in both prose and evidence between the two suggests that the discussion of the area-bombing campaign against Japanese cities was added as an afterthought. Two examples will illustrate. First, Grayling devotes almost 60 pages to examining Bomber Command's efforts in Europe but spends only three pages to investigate the United States' efforts over Japan. As a result, he does not unearth and examine the reasons underlying Maj Gen Curtis LeMay's decision to change tactics from precision to area attacks. Second, Grayling does not conduct a systematic analysis (as he did with Bomber Command) of the military gains achieved

by the firebombing and atomic bombing of Japanese cities against the costs of doing so, implicitly assuming that the American effort against Japan was disproportionate since no military gain could possibly offset the humanitarian costs. Although it would not be difficult to conduct such an analysis, Grayling's failure to do so and his broader lack of attention to the bombing of Japanese cities in comparison to his effort with Bomber Command constitute an important defect in this work.

Grayling's work has further flaws. First, it is internally inconsistent. In but one example, at the beginning of the book, he notes that his work "is not intended to impugn the courage and sacrifice of the men who flew RAF . . . bombing missions over Nazi-dominated Europe" (p. 7). Yet at the end of the day, he chastises Bomber Command aircrews for not refusing to accept the orders to bomb German cities. Second, and more importantly, he attempts to link Bomber Command's efforts and the resulting destruction of German social fabric to the so-called Morgenthau Plan—the proposal by Henry Morgenthau, US secretary of the treasury at the time, to divide, deindustrialize, and pastoralize Germany to ensure it would never again become powerful. Grayling offers no evidence in support of such a provocative assertion other than noting the coincidence that the ends of area bombing would go a long way toward establishing conditions necessary for the Morgenthau Plan's success.

Despite its flaws, Grayling's argument against Bomber Command is compelling—certainly worthy of reading and inclusion in any good library. Taken together with *Firestorm*, both volumes represent important contributions to the literature on airpower and morality in warfare. Beyond their significant contributions in historical and moral argument, the two books include themes that resonate today. As our nations confront the threat posed by radical fundamentalism, when might it be appropriate—if at all—for the exigencies of national security to trump our moral responsibilities, codified as international humanitarian law, for the protection of civilians and noncombatants? Even though today's precision weapons produce less collateral damage and less destruction overall, certain types of dual-use targets—such as electrical power—if disabled, could result in human suffering beyond the military advantage gained in striking them. In our contemporary "long war," should military leaders guard against becoming callous over an extended and exhausting conflict against an adversary who does not hold himself to the same moral and legal traditions and who is willing to use our readiness to restrain our conduct in this manner to his military advantage? Do current doctrine, technology, or organizational imperatives lend themselves to causing human suffering, even as an unintended consequence? In an era of instant news and when every bomb could have an indirect strategic effect, war fighters and commanders need to examine the moral lessons that can be gleaned from past conflicts. Such an examination could produce discomfort and perhaps even anger. But if it leads to a more discriminate and proportional use of the military instrument, such an examination will be well worth the effort.

Lt Col Peter W. Huggins, USAF
Maxwell AFB, Alabama

Combat Search and Rescue in Desert Storm by Col Darrel D. Whitcomb, USAFR, retired. Air University Press (http://www.maxwell.af.mil/au/aul/ aupress), 131 West Shumacher Avenue, Maxwell AFB, Alabama 36112-6615, 2006, 328 pages (softcover). Free download available from http:// www.maxwell.af.mil/au/aul/aupress/Books/ Whitcomb%20CSAR/Whitcomb.pdf.

Operation Desert Storm now has a secure place in the history books. Many surveys, books, and personal accounts of senior officers who led the planning and execution of the operation have scrutinized its air campaign. Despite the successes, all parties have expressed frustration with combat search and rescue (CSAR) during the war. Writers have inquired why our forces did not rescue more downed aircrews and other isolated personnel. Fighter crews felt betrayed when their buddies did not receive the same sort of CSAR effort as did the men who flew in Vietnam 25 years earlier. We know much about the plan and the sophisticated technology that were developed and employed, but up until now no one has examined the one part of the air campaign considered a disappointment. In *Combat Search and Rescue in Desert Storm*, Darrel Whitcomb takes on the challenge of finding out what went wrong and what went right.

Intimately familiar with CSAR, the author flew combat as a forward air controller in Vietnam, worked as a contractor within the Joint Personnel Recovery Agency, and wrote *The Rescue of Bat 21* (Naval Institute Press, 1998). He has also published articles on the subject in *Air and Space Power Journal*. In his latest thoroughly researched study, Whitcomb dissects the Joint Rescue Coordination Center's (JRCC) mission logs and unit histories, and his firsthand interviews with the planners, senior officers, and aircrews who participated in CSARs—

both rescuers and isolated personnel—lend further credibility to this important book.

The author sets the stage with several vignettes from Vietnam-era rescues in which Air Force Jolly Green forces made courageous pickups under such intense opposition that the pilots later received Air Force Crosses. One of them, Capt Dale Stovall, later became the vice-commander of Air Force Special Operations Command, and another, Capt Bennie Orrel, became director of operations for the 1st Special Operations Wing. A third officer, 2d Lt Richard Comer, assumed command of the 20th Special Operations Squadron, directed Air Force helicopters in Desert Storm, and was decorated for other actions in Southeast Asia. Whitcomb dispels the myth that these senior officers in Air Force Special Operations Command during Desert Storm were career special-operations types with no rescue background.

The author also looks at the command-and-control structure for CSAR, explaining why the Air Force did not deploy its Air Rescue Service during the operation. Regardless, Gen Norman Schwarzkopf tasked Lt Gen Chuck Horner, the air component commander, with the responsibility for theater rescue but not the authority to order the special-operations component's Air Force and Army helicopters to launch on a mission. The special-operations commander (an Army officer) had CSAR as a mission but retained both operational control of his assets and launch authority. However, because he did not own the assets to perform the search, he had to rely on the air component (mainly Air Force) for that function.

Whitcomb then addresses why our forces did not rescue more downed Airmen than they did. Examining the low success rate (p. 259), he discusses whether or not the JRCC initiated a search and the feasibility of rescuing a particular aircrew, analyzing the circumstances of each mission by drawing on JRCC logs and interviews with crews. Many times he finds that the downed aircrew members knew they would land close to forces they had just bombed or near Bedouins whom Saddam Hussein paid to turn them over to Iraqi soldiers. The barren landscape as well as the distance the rescue helicopters had to fly further exacerbated their recovery efforts. Whitcomb suggests that many of the aircrews who made it to the ground faced long odds even if the rescue force had been closer.

The book also addresses the complaints that Special Operations Command Central (SOCCENT), specifically Air Force Special Operations Forces (AFSOF), stayed too busy doing special-operations missions, that they did not have enough helicopters to perform both missions, and that AFSOF

leadership did not want to risk special-operations aircrews to retrieve just one flyer. Whitcomb conducted in-depth discussions with the wing and squadron leadership to understand their decision process for all missions handed down to SOCCENT. He also spoke not only with several pilots who attempted to rescue Stroke 65 and Corvette 03 but also with the ones who successfully rescued Slate 46A in a daring daylight mission on 21 January 1991 and Benji 53 during a night rescue on 17 February.

The author devotes several pages and detailed analysis to the nonrescue of Corvette 03—the most controversial mission of the war. The pilot and weapons-systems officer evaded the enemy for three days, walking nearly 15 miles toward the Syrian border before they were captured. Clearing the air on this matter, Whitcomb presents the facts as to why no dedicated search for these men occurred prior to their capture. He does a credible job of highlighting these missions as well as SOCCENT leadership's deliberate decision-making process and efforts to rescue downed crews.

Combat Search and Rescue in Desert Storm—a long overdue, objective analysis—thoroughly examines the facts without pointing fingers. On the modern battlefield, CSAR is no longer just a tactical mission to bring our countrymen home; rather, today's around-the-clock news cycle gives it greater strategic status in the information war. Colonel Whitcomb's book is a must-read for students of modern warfare, air planners, and personnel who may be tasked to perform CSAR in an effort to do a better job of leaving no man or woman behind in future conflicts.

Col Paul R. Harmon, USAF
Hurlburt Field, Florida

Children at War by P. W. Singer. University of California Press (http://www.ucpress.edu), 2120 Berkeley Way, Berkeley, California 94704-1012, 2006, 278 pages, $16.95 (softcover).

P. W. Singer's book *Children at War* is a sad, troubling look at a growing problem in the world today: children serving as soldiers. He looks at the historical precedent concerning the use of children in warfare, from the time-tested concept of bestowing honor and power upon warriors in exchange for guaranteeing protection for the unarmed—especially "the old, the infirm, women, and most particularly, children" (p. 3)—to the point where no civility or honor in conflict currently exists in much of the world. "The participants in battle are often no lon-

ger honored warriors, guided by an ethical code, but rather new predators, who target the weakest of society" (p. 4). Interspersed throughout the book are heart-wrenching quotations from child soldiers that make readers want to hug their own children and thank God for being born in a free country under the rule of law.

The numbers of children serving as soldiers are staggering. Singer canvasses the globe with examples such as the Sierra Leone civil war (1991–2001) in which up to 80 percent of all fighters ranged from ages seven to 14, many of whom were abducted (p. 15). He points out that in 68 percent of the world's current or recent conflicts, children under the age of 18 have served in combat. Particularly disturbing are examples of the brutal methods by which many children are recruited into war: "Now we were in a hideous state—they killed my parents in front of me, my uncle's hands were cut off and my sister was raped in front of us by their commander called 'Spare No Soul.' After all this happened, they told us, the younger boys, to join them. If not, they were going to kill us" (p. 61).

The author does an excellent job of sizing up the problem and addressing many of the underlying causes, such as poverty and the lack of economic and educational opportunity. The solution set, however, is a much more daunting task. Some of the causes have been around much longer than the problem of child soldiers. Singer calls for greater amounts of aid, pointing out that "the United States lags far behind the rest of the developed world in its aid to those less well off" (p. 136). Although that is true for government aid, it fails to account for the significant amounts donated by Americans through nongovernmental charitable organizations. Other, more achievable steps that he offers as part of the solution involve a change in US government policy that would support efforts of the United Nations and other elements of the international community to clamp down on the illegal trade of light weapons and that would criminalize the practice of having child soldiers so, at the least, legitimate state armies would stop using children.

The chapter dedicated to the issues and impact of having to fight against children is perhaps the most important to today's US military officer. Although it is unlikely that any 14-year-olds will be going one-on-one against any F-22 pilots, it is entirely possible that a child with an AK-47 could make his way to the gate of "Base X." In fact Iraq, Afghanistan, and other potential US deployment locations are not excluded from the rising use of children as soldiers. Singer correctly points out that current US military training and doctrine do not adequately prepare our personnel to recognize children as potential threats and to deal with the psychological impact of killing children, even in self-defense; for that reason, training and doctrine should be modified accordingly. I recommend *Children at War* to any US military leader who might deploy personnel anywhere beyond Western Europe.

Col Gregory J. Lengyel, USAF
Air Force Fellow
Brookings Institution, Washington DC

Spying from Space: Constructing America's Satellite Command and Control Systems by David Christopher Arnold. Texas A&M University Press (http://www.tamu.edu/upress), John H. Lindsey Building, Lewis Street, 4354 TAMU, College Station, Texas 77843-4354, 2005, 232 pages, $48.00 (hardcover).

As an Airman currently assigned to a satellite command and control (C2) squadron and having served previous tours in the space C2 arena, I looked forward with great anticipation to reading David Arnold's first-ever, full-length history of America's early satellite C2 systems. I was not disappointed. Arnold has done a spectacular job of weaving previously untapped and unpublished information from Air Force Space Command archives together with interesting and invaluable personal interviews to construct a history of the burgeoning Air Force Satellite Control Facility (forerunner of today's Air Force Satellite Control Network) from its infancy in the days of Sputnik to its culminating point at the end of 1969.

First, a necessary corrective observation: the title *Spying from Space* is somewhat misleading since Arnold's book is far less about early on-orbit reconnaissance systems themselves (such as the Corona program) and much more about the development and growth of the terrestrial infrastructure necessary to control and exploit those as well as other early space systems. I have learned that the original title (changed by a well-intentioned editor/publisher) was *Supporting New Horizons*, a much more appropriate choice, giving a nod to the early post–World War II Army Air Forces' *Towards New Horizons* future studies that laid the initial foundation for military space programs.

This different approach to early military space history is both immediately refreshing and long overdue because, despite countless publications on the first orbital systems themselves, not until now

have we had a study devoted fully to the management, technology, and people required to operate these systems from the ground. The latter story is in many ways the more captivating. It is unfortunate that so few people outside the world of space operations truly appreciate the difficulty of sustaining satellites on-orbit today—not to mention the magnitude of the challenges of satellite C2 ("Sat C2" in the space-operations vernacular) in its earliest days. Arnold brings these pioneering endeavors to life, explaining how—in the shadow of post-Sputnik angst—the Air Force strove to create the Sat C2 network needed to command, control, and sustain its new satellites on-orbit. Thus begins the tale of the rise of space-operations Sat C2 sites at Sunnyvale, California; Vandenberg AFB, California; and such dispersed locations as Hawaii, Alaska, and Greenland.

Arnold's book also includes first-person interviews with the late Gen Bernard Schriever and a number of other Air Force space pioneers and veterans from the 1960s. To me, these personal recollections represent the most valuable and interesting part of the study. Those who work in today's Sat C2 world of (relatively) high data rates, dozens of satellites, hundreds of commands, and thousands of telemetry points will find retired Air Force lieutenant general Forrest McCartney's contrasting musings on "four total available commands" and agonizingly slow telemetry-tape playbacks over phone lines both archaic and charming. Equally interesting are the first-person descriptions of those Sat C2 dynamics that have *not* changed over the decades, such as the "competitive spirit" between blue-suit operators and their contractor counterparts, or the tension between the intelligence and operations communities. Still another key achievement of the book is its brief (perhaps too brief) description of the parallel developments of the Soviet Union's Sat C2 system and how it compensated for the comparatively poor (at least with regard to the Sat C2 mission) geographic location of Soviet territory with creative orbits, international agreements, and technical solutions (such as "fishing trawlers" anchored at various points on the globe).

In *Spying from Space* (or, again, more appropriately, *Supporting New Horizons*), David Arnold has taken a precious first step towards preserving and sharing the history of the US Sat C2 story. In the end, this avant-garde work demands a sequel or two: How did the nature of Sat C2 change with the dramatic shift of operations during the 1980s from the cramped Satellite Test Center in Sunnyvale to the sprawling Consolidated Space Operations Center (now Schriever AFB) east of Colorado Springs?

What tales do space-operations veterans of the 1980s and 1990s have to tell, and how do those compare to the stories of the Sat C2 pioneers in Arnold's work? How has the transition of Sat C2 from exclusively strategic-reconnaissance programs such as Corona to the inclusion of more "mainstream" systems such as MILSTAR and the global positioning system (with their vastly wider user communities) led to changes in training, doctrine, and execution of Sat C2? This book, which will serve as the foundation for such future histories and analyses of US Sat C2, is a necessary read for air and space professionals desiring to better understand and appreciate the rich heritage of space operations.

Lt Col John E. Shaw, USAF
Washington, DC

The Precision Revolution: GPS and the Future of Aerial Warfare by Michael Russell Rip and James M. Hasik. Naval Institute Press (http://www.usni.org/press/press.html), 291 Wood Road, Annapolis, Maryland 21402-5034, 2002, 448 pages, $55.00 (hardcover).

New technological advances such as sliced bread, indoor plumbing, automatic machine guns, and blitzkrieg warfare seemed revolutionary at their inception, but we quickly adopted them and took them for granted—in retrospect, sometimes we even considered these innovations obvious or inevitable. Such is the fate of precision weapons and the global positioning system (GPS). *The Precision Revolution: GPS and the Future of Aerial Warfare* offers an excellent review of the history of the GPS and describes the revolutionary impact it had on airpower during the conflicts of the 1990s. Precision engagement has become so engrained in today's Air Force that we can hardly remember the navigation and weapon-delivery challenges we faced little more than a decade ago. Authors Michael Rip, a professor at Michigan State University, and James Hasik, a former Navy officer who now works as a management consultant specializing in defense issues, increase our appreciation of the GPS's tremendous value for today and the future.

They have filled the book with hundreds of photos, drawings, and maps that greatly aid readers' understanding and keep their interest level high. Chapter 2, for example, contains a brief history of military air and space navigation, focusing on World War II navigation problems as well as radio and radar systems developed to address those issues.

The chapter contains detailed diagrams of how the Knickebein, X- and Y-Verfahren, and Gee radio-navigation systems worked, together with pictures of and from the H$_2$S radar system.

The book then rushes quickly through the Cold War satellite systems used by submarines as well as the ballistic missiles launched by those platforms and on to the GPS and the Soviet Global Navigation Satellite System. Barely mentioning Vietnam, Rip and Hasik discuss the first use of laser-guided precision bombs but, unfortunately, do not cover other important, pertinent navigation and weapon-delivery technologies (e.g., tactical air navigation and TSQ-81 bombing radar). Thus, readers seeking a full history of aerial navigation and weapon delivery will be disappointed.

Following an excellent and easily understood description of how the GPS system works, the authors dedicate most of the book to a history of the use of the GPS in conflicts of the 1990s—from Operations Desert Storm to Allied Force—and descriptions of today's GPS weapon systems together with their capabilities and limitations. They present thoroughly researched statistics and detailed accounts of how GPS aids aerial and ground navigation, precision-weapon delivery, and search-and-rescue missions. Their study makes a strong case that we are in the midst of a "precision military-technical revolution" similar in transformative scope to the Napoleonic, industrial, mechanized, and nuclear revolutions.

Rip and Hasik effectively explain both the technical and nontechnical limitations of both GPS and precision-weapon technology, noting that autonomous GPS-guided weapons have limited utility against mobile and well-concealed targets. We learn why GPS jamming is not as serious a concern since low-power jammers, though easy to build, are easy to counter, and high-power jammers, though expensive to build, are easy to find and destroy. The book examines why precision weapons require precision intelligence, citing examples of how intelligence shortfalls have caused precision munitions to fail to produce desired political effects. Similarly, it discusses the dangers of becoming infatuated with precision technology, noting the "cruise missile diplomacy" of the 1990s, wherein GPS-guided weapons functioned perfectly from a technical perspective but often did not achieve hoped-for results.

The book does not lay out a technical vision for the future of either the GPS or precision weapons, leaving unanswered such questions as how we could make the GPS even more accurate, reliable, robust, and/or ubiquitous, and what military benefits might ensue. Instead, the authors tackle the more difficult question of what precision navigation and engagement mean to the future of aerial warfare. Although written prior to the terrorist attacks of 9/11 (the book includes a postscript composed shortly thereafter), the study's predictions for the challenges the United States would likely face in future conflicts are certainly coming true today in North Korea, Iran, China, Iraq, and Afghanistan. The GPS is one of the reasons that enemies know they cannot defeat the United States in a conventional conflict. Concluding that only nuclear weapons can absolutely guarantee their security, they have therefore increasingly emphasized *maskirovka* (concealment and deception), mobility, and asymmetric warfare to make targets very hard to find.

Rip and Hasik's use of hundreds of useful statistics and charts to support their analysis makes *The Precision Revolution* a valuable airpower reference book certain to be used and cited by scholars interested in these topics. Extremely well written and engaging to a variety of readers, it will appeal to anyone who wishes to understand more about the history and analysis of the GPS, its effect on aerial warfare, and the strategic challenges facing airpower as a result of the "precision revolution." I recommend it highly.

Maj Eric J. Felt, USAF
Air Force Fellow
Defense Advanced Research Projects Agency

Boys of '67: From Vietnam to Iraq, the Extraordinary Story of a Few Good Men by Charles Jones. Stackpole Books (http://www.stackpolebooks.com), 5067 Ritter Road, Mechanicsburg, Pennsylvania 17055-6921, 2006, 416 pages, $29.95 (hardcover).

At first glance, *Boys of '67* appears to be a rousing text, somewhat akin in spirit to Stephen Ambrose's *Band of Brothers* or James Kitfield's *Prodigal Soldiers*; after all, the cover boasts a positive review from Rick Atkinson, author of the Pulitzer-prize-winning work *An Army at Dawn.* It also contains a respectable foreword by Gen Anthony Zinni, former commander of United States Central Command and one of the most respected military leaders in recent history. Thusly prepared, one expects a motivating text that both educates and inspires. Unfortunately, this is not the case.

Boys of '67 follows the careers of three Marine officers—Gen James L. Jones Jr., Lt Gen Martin R. Steele, and Maj Gen Ray L. Smith—from their at-

tendance at the Basic School (where newly commissioned Marine lieutenants learn the art and science of the warrior trade), through combat action in Vietnam, and on through the rest of their careers. Although this book does a fine job of chronicling the formative years of these officers—especially the chapters on their initial combat exploits in Vietnam—it later falls short in meeting the expectations generated from reading the first few pages. Indeed, instead of a story of perseverance and pride, the author presents the officers' careers in a fairly disjointed manner, jumping across the years instead of providing a logical flow of information. Furthermore, one underlying characteristic detracts greatly from the work: the relationship of the author to one of the main subjects.

Author Charles Jones is the son of Lt Gen William K. Jones, USMC, and the cousin of Gen James Jones, one of the key figures in the text. Thus, one can understand that Jones's admiration of his cousin as a warrior might color his views a bit. However, throughout *Boys of '67* the author fails to provide an objective view not only of his cousin but also of the other officers as well. Indeed, the mostly one-sided perspective of events further heightens the sense of infallibility regarding his subjects. The book opens with several unflattering (and unnecessary) anecdotes of Gen Tommy Franks, with the author quoting his cousin (once again, a general) as describing Franks's book as "flawed, self-serving, and inaccurate" (p. 2). Unfortunately, that critique can apply to *Boys of '67* as well.

The work is very scantily sourced; many chapters in my advance copy have very few documented sources to support Mr. Jones's portrayal of events. Indeed, one chapter lists not a single reference at all. Furthermore, the text contains glaring inaccuracies that even a novice would detect, let alone any serious reader of military affairs. For example, in a chapter on Vietnam, the author refers to reports of alleged atrocities "including the murder of twenty-two Vietnamese civilians at My Lai" (p. 110). Over 100 people were killed and wounded at My Lai, a fact easily sourced. Jones also refers to the USS *Blue Ridge* as "a hulking destroyer whose guns glistened in the sun" (p. 328), but this ship is a command vessel with limited armament. Granted, these two examples may appear trivial, but they typify the book's problem—poor documentation and questionable sourcing.

In fact, in chapter 13, "Combat at Chrysler," Jones tells the story of Marty Steele, a major at the time, assigned as a liaison officer to supervise tank production in Michigan. We learn that Major Steele confronts the Chrysler management over the qual-ity of M-60 tanks and that the workers "tended to talk to him more, and even confide in him" while supervisors "nervously shooed him away" (p. 190). Jones alludes to the fact that Major Steele's follow-on report, dealing with tank periscopes, was "labeled top secret" and that "because it was handled quietly, and was a classified matter, the internal affair has . . . never been publicly scrutinized" (pp. 196–97). One problem—there is absolutely no (zero) documentation or sourcing for this chapter. And this is not the only unsubstantiated "fact" in *Boys of '67.*

Subsequent chapters highlight the three officers' careers. For the most part, the author presents them in the same style—that is, with little sourcing, somewhat accurately, and painting an overly flattering picture of the protagonists. Of note are several pages wherein Jones, a lieutenant general at the time, advises Secretary of Defense William Cohen on Khobar Towers. Predictably, the author highlights the contributions of his cousin while providing a much less charitable view of the Air Force leadership with regard to this incident. Indeed, throughout the text, sister services and their leadership just don't measure up, but the marines documented appear stellar in every way.

Although each of the officers is a fine, noble man, the book's underlying bias detracts from their respective stories. The author highlights how General Jones served as an aide to several general officers and went on to spend five years in the Pentagon as a military liaison. Furthermore, he illustrates how working with Senator William Cohen and other members of Congress benefited his career later on as Secretary of Defense Cohen's military advisor and eventually as commander of European Command. The story suffers greatly from this overwhelming sense of patronage.

After reading this book, Air Force officers would have the impression that if they are related to a general officer, good things can happen to them, regardless of their own bravery and dedication to service. Furthermore, if they serve multiple staff tours as a general's aide and then go on to make friends in Congress, they will become quite successful, even though they are warriors in their own right.

However, one bright spot in *Boys of '67* will resonate with many Air Force members—author Jones includes several pages on Clebe McClary, a Marine junior officer and one of the keynote speakers at Squadron Officer School. Jones presents a very touching vignette of McClary, who, after being wounded in Vietnam, went on to become a dynamic motivational speaker and a living inspiration for everyone. If Jones had written a book on

McClary, *that* would have been a truly inspiring text; unfortunately, *Boys of '67* is not.

Lt Col Richard J. Hughes, USAF
Maxwell AFB, Alabama

Shattered Sword: The Untold Story of the Battle of Midway by Jonathan Parshall and Anthony Tully. Potomac Books (http://www.potomacbooksinc.com), 22841 Quicksilver Drive, Dulles, Virginia 20166, 2005, 568 pages, $28.00 (hardcover).

Jonathan Parshall and Anthony Tully have produced a work designed to do nothing less than fundamentally change our understanding of the Battle of Midway. Examining the battle from the Japanese perspective, the authors contend that the reasons for the Japanese defeat lay not in decisions made during the battle but in the doctrinal, technological, and ideological development of the Imperial Japanese Navy and decisions made before the battle that flowed from such development. Along the way, Parshall and Tully dispel several long-standing myths regarding the battle that emerged shortly after the war and hardened in the minds of scholars and laymen alike. They are tremendously successful on both counts.

The authors logically detail the Imperial Japanese Navy and its carrier force's development prior to World War II. They show various influences, from the Royal Navy, to the Russo-Japanese War, to the interwar period, and the way they produced a force optimized for hyperoffensive warfare at all levels. Parshall and Tully also explore the technological and doctrinal capabilities of the carrier force—from radar, to search planes, to damage control. They do so not in the vein of "gun boors" who revel in the esoteric minutiae of calibers and muzzle velocity, but by way of explaining what Adm Nagumo Chuichi and his force *could* do, could *not* do, and what they were *trained* to do. The authors also illustrate these issues by exploring the carrier force's pre-Midway battle record. Doing so allows them to examine the battle in context—judging the Japanese not in light of what Western historians think they should have done, but according to what was reasonable to them, given all of these factors. Their narrative is both enlightening and persuasive.

The authors systematically examine and debunk many of the prevailing myths of the battle, including the "fatal error" of Nagumo's rearming his strike aircraft during the battle, the "pivotal" role of the *Tone*'s floatplane no. 4, the "noble sacrifice" of the

USS *Hornet*'s torpedo squadron, and the notion that the Americans were tremendously outnumbered. By doing so, Parshall and Tully substantively discredit Mitsuo Fuchida's *Midway: The Battle That Doomed Japan* (Naval Institute Press, 1955) and explain why the Japanese version of the battle has been late in coming to the West. Although they believe that the American side of events has been adequately covered in Gordon W. Prange's *Miracle at Midway* (McGraw-Hill, 1982) and Walter Lord's *Incredible Victory* (Harper & Row, 1967), most portions of those works that rely on Fuchida as a source for Japanese perspective now have to be taken with a grain of salt. Indeed if there is a shortcoming in the work, it is by design. The authors purposely confine their examination to the Japanese side of things; thus, a novice should read their book in conjunction with either Prange's or Lord's work.

For even the casual student of the Pacific War, however, *Shattered Sword* succeeds decisively in changing perceptions of the Imperial Japanese Navy, the role of doctrine and training, and the Battle of Midway. The book exhibits the best uses of both technological and "revisionist" history, fundamentally transforming the historical record in light of new evidence and new techniques—not new social agendas. *Shattered Sword* will have a significant impact on the historiography of the Battle of Midway and the Pacific War. Hopefully, its success will lead other scholars to look for new perspectives in a theater that many have considered "dead territory."

Maj Christopher Parrish, USAF
Dyess AFB, Texas

Espionage: A Reference Handbook by Glenn Hastedt. ABC-CLIO (http://www.abc-clio.com), 130 Cremona Drive, Santa Barbara, California 93117, 2003, 225 pages, $45.00 (hardcover).

Author Glenn Hastedt's theme throughout *Espionage: A Reference Handbook* is that espionage is the act of secretly collecting information—more commonly known to Americans as spying. Arguing that espionage and its inevitable partner, counterespionage, are central to a state's national security, Hastedt skillfully explores numerous historical examples from the American Revolution to events subsequent to the terrorist attacks of 11 September 2001, tracing the evolution of intelligence-collections capabilities—particularly human intelligence (HUMINT). He demonstrates that from the Boston Tea Party to the Civil War, espionage

has played a key role in the planning phases of combat. Indeed, protecting ourselves against national security threats has become a high priority. Hastedt uses historical examples to show how terrorism has made counterespionage crucial to the safety of our citizens and what can happen when we get it wrong.

We learn that the field of military intelligence and organizations such as the Joint Chiefs of Staff, Office of Strategic Services, and Central Intelligence Agency emerged to facilitate intelligence collection as a response to newfound requirements for secret information. Interestingly, Hastedt points out that many of these organizations came about as a result of trial and error. Following the discovery of weaknesses in various US government departments, new agencies seemed to evolve to compensate for the security threat or breach that might have occurred in the prior organizational structure.

Using biographical sketches of intelligence officers, key figures, and declassified cases, the author illustrates *why* spies do what they do, indicating that most are male and that they usually become involved in espionage because of issues related to money, women, and/or blackmail. Some people have spied for all three reasons, taking advantage of their security clearances, access codes, plans, and the trust of the American people to sell out the United States. Thus, espionage makes counterespionage necessary. Just as the United States uses its resources to gain valuable information about other nation-states, so do other entities spy on America. In most cases, US counterespionage initiatives lead to the capture of their agents.

Weaving a tapestry of HUMINT's history from both an institutional and a personal perspective, *Espionage* presents its subject most effectively. I recommend it to anyone interested in the world of spying.

Maj Reginald L. Bullock, USAF
Air Force Fellow
Washington, DC

Cradle of Conflict: Iraq and the Birth of Modern U.S. Military Power by Michael Andrew Knights. Naval Institute Press (http://www.usni.org/press/press.html), 291 Wood Road, Annapolis, Maryland 21402-5034, 2005, 462 pages, $39.95 (hardcover).

Cradle of Conflict by Michael Knights is a comprehensive summary of US military operations in Iraq from 1990 to 2005. Offering a wealth of technical knowledge, it summarizes years of continuous military conflict between the United States and Iraq. Although the level of detail at times becomes overwhelming, anyone interested in acquiring an in-depth understanding of the forces driving this conflict has much to gain by reading this work.

Knights presents extensive information regarding the tactics, planning, doctrine, employment, and development of weapons systems as well as the strengths and weaknesses of both the US and Iraqi militaries. Moreover, he provides thorough descriptions of the operational decisions made by commanding officers during all of the major combat, beginning with Operations Desert Shield and Desert Storm. Knights also describes the implementation of no-fly zones during Operations Northern and Southern Watch, the "Tomahawk diplomacy" of Operations Desert Strike and Desert Fox, and removal of the Baathist regime and the ensuing insurgency emerging from Operation Iraqi Freedom.

The author discusses the sequence of military conflict in Iraq in several ways, beginning with United Nations (UN) Security Council resolutions and their enforcement during combat operations. He also touches on some amazing US military firsts, including the first-ever air-to-air combat between manned and unmanned aircraft and the first bombings by female pilots in combat. Knights then explains the changes experienced by the US military throughout its dealings with Saddam Hussein, such as shifting from its original strategy of containment to an all-out offensive geared towards dismantling Iraq's military capability following years of enduring that country's "cheat and retreat" tactics (e.g., interference in the UN weapons-inspections process, massing troops on the borders of neighboring states, and numerous violations of the no-fly zones).

The author also reminds us that warfare—even high-tech war—is still subject to the same age-old restrictions that not even advances in US war-fighting technology can overcome. These include the difficulty of performing air strikes through dense cloud cover, the inability of pilots to laser-designate ground targets through blowing sand, the role of stress and fatigue, and the crash of several Apache helicopters due to violent sandstorms.

Along with the highs and lows of combat operations, Knights intersperses some inspiring narratives of selfless bravery by US military personnel. One such account depicts Marine Corps helicopter pilots risking their lives while flying at treetop level in sandstorms to provide close air support to troops trapped by intense fighting.

Although very well written, *Cradle of Conflict* contains a surprising number of misspellings and grammatical errors. Despite its lack of adequate editing, it does an exceptional job of explaining how "the Baathist regime's decades-spanning campaign to resist U.S. military pressure was the crucible on which the post–Cold War U.S. military was forged and given its keen edge" (p. xi). I highly recommend this book, which is a must-read for any serious student of modern Iraq.

Cadet Dayton J. Miller, USAF
Air Force ROTC, University of Houston

The War of the World: Twentieth Century Conflict and the Descent of the West by Niall Ferguson. Penguin Group USA (http://us.penguingroup .com), 375 Hudson Street, New York, New York 10014, 2006, 544 pages, $35.00 (hardcover).

In H. G. Wells's classic *The War of the Worlds* (1898), Martian invaders launch a series of catastrophic attacks, decimating major cities throughout the world and ravaging their inhabitants. According to Niall Ferguson, a history professor at Harvard University and author of *The War of the World: Twentieth Century Conflict and the Descent of the West*, Wells's description of death and destruction is an apt metaphor for the nature of conflict during the bloodiest century in modern history:

> Invaders approach the outskirts of a city. The inhabitants are slow to grasp their vulnerability. But the invaders possess lethal weapons: armored vehicles, flame throwers, poison gas, aircraft. They use these indiscriminately and mercilessly against soldiers and civilians alike. The cities' defenses are overrun. As the invaders near the city, panic reigns. People flee their homes in confusion; swarms of refugees clog the roads and railways. The task of massacring them is made easy. People are slaughtered like beasts. Finally, all that remains are smoldering ruins and piles of desiccated corpses (p. xxxiii).

Unlike Wells's war between worlds, the war of the world and surreal acts of violence described by Ferguson in his history of twentieth-century conflict are perpetrated not by aliens but by human beings.

With two world wars that resulted in the killing of significantly larger percentages of the world's population than had died in any previous war of comparable magnitude and at least a dozen other conflicts that had death tolls exceeding a million, *The War of the World* explores the question of why the twentieth century, a time of unparalleled prog-

ress, was so bloody. Ferguson's premise is that the typical historical rationales for the extreme levels of violence in the twentieth century—expanding populations living closer together, class conflict, economic crises, emergence of the modern state, and increasing destructiveness of weaponry—do not provide a satisfactorily complete explanation. Instead, he proposes three phenomena to account for the outbreak of conflict at specific times and locations: ethnic conflict, economic volatility, and the decline of empires.

Ferguson analyzes the contribution of those phenomena to twentieth-century conflict within three time frames. The first period covers World War I through the Korean War. According to the author, this period was characterized by a "succession of head-to-head collisions between the world's empires played out in the crucial conflict zones at either end of the Eurasian land mass" (p. 606), which he calls the "War of the World." One of the many interesting observations he offers is that World War I was not "an inevitable consequence of deep-seated great-power rivalries" (p. 91), as postulated by some historians. Instead, Ferguson analyzes economic factors such as the relative stability in bond markets during 1914, concluding that "rather than a long road to catastrophe, there was but a short slip" (p. 91), thus bolstering the idea that World War I resulted from an avoidable political error.

During the second time period, defined by the Cold War, conflict shifted to more remote regions of the world and involved proxy wars between the superpowers. Ferguson believes that this change resulted from the diminished possibility of ethnic conflict in the western and eastern borderlands of Eurasia, a reduction in the volatility of growth in the world's seven biggest economies, and imperial decline in those regions where conflict occurred. He calls this era the "Third World's War" and highlights the absurdity of remembering the Cold War as a time of peace and stability by pointing out that 19 to 20 million people died in approximately 100 military conflicts between 1945 and 1983.

Finally, the period after the collapse of communism and disintegration of the Soviet Union, the "New World Disorder," has featured fewer wars between states but a soaring number of civil wars. The author examines the breakup of Yugoslavia, the resulting carnage in the Balkans, and the genocide in Rwanda. Citing one estimate that global warfare has decreased by over 60 percent since the mid-1980s and is now at its lowest level since the late 1950s, he offers some reason for optimism. However, Ferguson anticipates the end of the New World Disorder and the potential for future con-

flict with the rise of China and demographic advantages of radical Islam.

Exhaustively researched (the book includes 109 pages of endnotes) and well written, *The War of the World* is a fascinating study of the nature of conflict in the twentieth century. Readers of *Air and Space Power Journal* will find the sections describing the effects and effectiveness of the strategic-bombing campaign during World War II worthwhile. Ferguson devotes the bulk of his study to the origins of ethnic conflict in the interwar years as well as the events and battles comprising World War II. (He has previously written about World War I in *Pity of War: Explaining World War I* [Basic Books, 1999].) A more in-depth look at the last four decades of the twentieth century, which he addresses in the epilogue, would have proved beneficial but likely would have pushed the length of the book beyond 1,000 pages and intimidated many potential readers. Furthermore, placing all maps in the relevant chapters for easy reference rather than at the very beginning of the book seems more sensible. Finally, although Ferguson identifies the descent of the West and reorientation of the world to the East as the most important developments of the twentieth century, he devotes only a few pages in the introduction and epilogue to exploring this topic, failing to adequately explain how the emergence of the United States as the world's lone superpower at the end of the millennium fits into his thesis. Still, I highly recommend *The War of the World,* especially in light of the global war on terrorism and the United States' recent experiences in Afghanistan and Iraq. As Ferguson notes at the end of his book, "We shall avoid another century of conflict only if we understand the forces that caused the last one—the dark forces that conjure up ethnic conflict and imperial rivalry out of economic crisis, and in doing so negate our common humanity" (p. 646).

Col Thomas A. Henwood, USAF
Air Force Fellow
Georgetown University

Bombing the European Axis Powers: A Historical Digest of the Combined Bomber Offensive, 1939–1945 by Richard G. Davis. Air University Press (http://www.maxwell.af.mil/au/aul/aupress), 131 West Shumacher Avenue, Maxwell AFB, Alabama 36112-5962, 2006, 648 pages, $55.00 (softcover). Free download available from http://www.au.af.mil/au/aul/aupress/Books/Davis_B99/Davis_B99.pdf.

In *Bombing the European Axis Powers: A Historical Digest of the Combined Bomber Offensive, 1939–1945*, Dr. Richard Davis demonstrates his talent for extensive research and analysis, guiding the reader through virtually every conceivable facet of planning and execution faced by Anglo-American forces in World War II. His detailed descriptions of missions performed by the Allied command reflect his extensive use of sources, including original government documents for verifying all of the bombing statistics. The book includes a CD-ROM containing a listing of numerous spreadsheets, charts, aircraft diagrams, maps, and historic photos, the latter two useful in helping the reader visualize the bombing campaign. The spreadsheets' and charts' organization of the information makes analysis of the bombing operations as simple as comparing numbers on a screen.

The book begins with a comprehensive overview of the difficulties that attended the organization of Allied forces; it then proceeds with a monthly chronology of the war. Through subsequent chapters, Davis reveals many important points that greatly affected the war effort:

- Reluctance of Allies to admit to city bombing until the end of the war despite dedicating numerous sorties for this purpose.

- Arguments between advocates of the Royal Air Force's (RAF) night bombing and those who championed the Army Air Forces (AAF) daylight bombing, leading to creation of the Combined Bomber Offensive.

- Gen Carl Spaatz's and other commanders' combat-tour policies and their effect on morale and survival of aircrews.

- Radar development and testing on aircraft by the RAF and modifications by the AAF.

- Mine-laying operations and their value.

- Development of long-range fighter escorts as the Eighth and Fifteenth Air Forces sustained high casualty rates while bombing deep into Germany.

Throughout *Bombing the European Axis Powers*, Davis cites information available to Allied commanders and then analyzes their decision making. His practice of making available accurate postwar records to facilitate the critiquing of decisions is quite effective, especially when he describes how the original formation of the Allied command structure (particularly the AAF's) led to disorganization and misinformation.

The portion of the book that addresses the Sicily campaign still has relevance for modern readers. Davis explains the problems that commanders faced while staging air attacks on marshaling yards in Rome, particularly the fact that the Vatican posed a serious political obstacle because of its location only a few hundred yards from a primary target. The attack had a surprising psychological outcome: Mussolini's overthrow by a coup just six days later. However, Davis quickly notes that, "Italy, as did others, bowed to the will of its enemies because of a complex combination of economic, political, geographic, and military pressure, not from the coercion of airpower alone" (p. 150). As for the strategic bombing campaign in the final months of the war, the author observes that "by the beginning of April 1945 the Anglo-American strategic bomber commanders could scarcely find a target in the detritus of the Nazi state that justified the expense of mounting an operation against it" (p. 555).

Although *Bombing the European Axis Powers* proved incredibly informative and included many interesting conclusions, some readers may struggle with its detail and length, which may have more appeal to academics. However, it is a must-read for anyone looking for an in-depth study of strategic bombing during World War II.

Cadet George H. Van Dyke III
Air Force ROTC, University of Houston

The Crisis of Islam: Holy War and Unholy Terror by Bernard Lewis. Weidenfeld and Nicolson, Orion Publishing Group (http://www.orionbooks.co.uk), 5 Upper Saint Martin's Lane, London, WC2H 9EA, 2003, 192 pages, $19.95 (hardcover); 2004, 208 pages, $12.95 (softcover).

Author Bernard Lewis, Cleveland E. Dodge Professor of Near Eastern Studies, Emeritus, at Princeton University, is one of the world's foremost historians on the Middle East. His more than two dozen books include *The Arabs in History* (1950), *The Emergence of Modern Turkey* (1961), *The Assassins: A Radical Sect in Islam* (1967), *The Muslim Discovery of Europe* (1982), *The Political Language of Islam* (1988), *The Middle East: A Brief History of the Last 2,000 Years* (1995), and *What Went Wrong? The Clash between Islam and Modernity in the Middle East* (2003).

His book *The Crisis of Islam: Holy War and Unholy Terror* leads the reader through Islamic history as distant as the thirteenth century but uses events of the twentieth century as its primary focus. Lewis addresses the long, downward spiral of Muslim world dominance as an example of why we are seeing violent reactions today from Muslim fundamentalists.

He begins by defining Islam as a way to shift the standard Western paradigm. Traditionally, Westerners view the world in terms of nation-states with governing bodies and political leaders; however, Islam transcends this rudimentary model by representing over 1.3 billion people scattered from Morocco to Indonesia, bound by a common religion and separated by "state" demarcations, most of them drawn by Western European rulers without regard to Islamic culture or desires. Among many other problems, the book points to the creation and support of Israel as a prime area of confrontation in the region.

Perhaps the highlight of the book, the final two chapters—"The Marriage of Saudi Power and Wahhabi Teaching" and "The Rise of Terrorism"—effectively tie the previous seven chapters together to paint a vivid picture of why we find ourselves in our current situation. Although the author stops short of proposing solutions, he does give the reader an unbiased appreciation for some of the strife felt by Muslim fundamentalists and the continuing threat of Western democracy (and decadence) in the region.

Lewis does a good job of supporting his positions with hard-hitting examples, often citing the Quran to show how terrorists improperly use it as justification for their actions. *The Crisis of Islam* is not necessarily an easy read: readers should come to it with a basic knowledge of the appropriate geography and history. Despite the fact that I was not intrigued by Lewis's writing style, I felt that he did present the material in a logical, comprehensible manner, and I therefore recommend it to anyone desiring to know more about Islam and the Middle East.

Lt Col Ken Sersun, USAF
Air Force Fellow, RAND
Santa Monica California

Man without a Face: The Autobiography of Communism's Greatest Spymaster by Markus Wolf. Public Affairs (http://www.publicaffairsbooks.com), 250 West 57th Street, Suite 1321, New York, New York 10107, 1999, 460 pages, $19.00 (softcover).

Do you yearn for a good Cold War espionage story, one full of the cloak-and-dagger drama of treacherous cross-border operations? This book will cure that itch, for sure—and with a unique

twist. Wolf's autobiography is the real-world story upon which so many spy novels are based.

Col Gen Markus Wolf served as chief of the Foreign Intelligence Service in the East German Ministry of State Security, known as the Stasi, where he directed over 1,000 agents who infiltrated all sectors of West German political life, business, and other sectors of society. They also penetrated the National Security Agency, Central Intelligence Agency, North Atlantic Treaty Organization, and even West German chancellor Willy Brandt's inner circle (the greatest spy scandal in postwar Germany.) His story covers exotic and dangerous operations such as spy exchanges, dead drops, sleeper agents, recruiting and running moles, false identities, turning captured spies into double and triple agents, psychological warfare, disinformation, kidnapping, Romeo spies, and the never-ending quest for hard currency to pay off his West German agents. Interestingly, John le Carré, who authored a trilogy of books concerning the British Secret Intelligence Service during the Cold War, featured spymaster George Smiley as his protagonist. Rumor has it that Wolf served as the model for Smiley's opposite Soviet number, codenamed Karla, although le Carré has denied this.

Referred to in the West as "the man without a face" for his ability to avoid being photographed, Wolf was born in southwest Germany in 1923; his father was a Communist and a Jew. The family fled Nazi persecution and settled in Moscow in 1934, where Wolf attended elite party schools and became a Soviet citizen, a convert to Stalinism, and fluent in Russian. He also joined the Communist International (Comintern), where he underwent training in intelligence work. After Stalin dissolved the Comintern in 1943, Wolf was assigned as a radio reporter in Moscow, where he met Walter Ulbricht, later the first leader of East Germany. Wolf covered the Nuremberg war trials while working as a reporter in Berlin, returned to Moscow for a brief diplomatic assignment, and then returned to Berlin in 1951 to assist in setting up East Germany's embryonic intelligence network.

Less than two years later, Ulbricht promoted Wolf, just 29 years old, to oversee East Germany's Foreign Intelligence Service. Wolf never indicates why Ulbricht selected him, although he was sure that his upbringing and connections with Moscow had much to do with it. His mission called for gathering political, scientific, and technical intelligence (as well as intentions) about West Germany / West Berlin and passing all of this information to Moscow. For the next 34 years, Wolf developed his department into what became recognized as the most effective and efficient of all Communist espionage services. He retired in 1985, four years before the Berlin Wall came down.

Wolf was tried for and convicted of treason in 1993, a ruling overturned by a higher court in 1995. In the book, he reveals that he did not feel treasonous but wrongly prosecuted, complaining of victor's justice. By uncovering the existence of multiple Nazis in the West German government (proof of which he provided to West Germany at strategic moments), Wolf helped maintain a half century of peace, the longest Europe had ever known. He felt vindicated by this act, which gave statesmen some assurance that they would not be surprised by the other side.

Wolf directed the majority of his efforts toward West Germany, capitalizing on a unique cultural and geographical situation that excused his agents from learning new customs and traditions or nuances of new languages. In addition, his people were largely interchangeable with the ones on the other side of the border. Travel, distances, and mingling did not present significant obstacles. Thus, he could rely almost exclusively on human intelligence (HUMINT) with little need for signals and imagery intelligence (SIGINT and IMINT). In contrast, the bulk of the United States' intelligence-gathering efforts is based upon SIGINT and IMINT, with HUMINT playing only a limited role. As many people have pointed out, our intelligence shortcomings in the lead-up to the Iraq war underline the limitations of relying almost exclusively on SIGINT and IMINT.

Anyone associated with intelligence gathering, including US military personnel, should certainly read and study *Man without a Face*, which will give them an understanding of how HUMINT can work and how important it can become; furthermore, Wolf's autobiography will give them the chance to make use of some of its lessons learned. I am not certain how significant this story might be for a run-of-the-mill military officer—or even a senior officer—not involved in intelligence work. Although it may satisfy a personal curiosity, I have my doubts as to its professional usefulness.

(As an aside, like a character in any good spy novel, Wolf's life ended with a twist: he died on 9 November 2006—the 17th anniversary of the fall of the Berlin Wall, the symbolic end of the Cold War.)

Lt Col Roftiel Constantine, USAF
Air Force Fellow
Cambridge, Massachusetts

*A*ir and Space Power Journal, the US Air Force's professional journal, is published in English, Spanish, Portuguese, Arabic, French, and Chinese. Each version is independent and has an editor—a native speaker of the particular language and an expert in the region of coverage—who selects its content. We're always looking for good, thought-provoking articles up to 5,000 words in length, written in any of our published languages. All submissions will be edited in accordance with the standards set forth in the *Air University Style and Author Guide* (available online at http://aupress .maxwell.af.mil/Resources/style/austyle_guide .pdf). For details, please see our guidelines for submitting articles at http://www.airpower.maxwell.af .mil/airchronicles/howto1.html. You can contact us by e-mail at aspj@maxwell.af.mil; regular mail at *Air and Space Power Journal*, 401 Chennault Circle, Maxwell AFB AL 36112-6004; phone at DSN 493-5322 (commercial [334] 953-5322); or fax at DSN 493-5811.

Subscribing to *ASPJ*:
Both Printed and Electronic
Subscriptions Are Available

Printed copy

- The *Journal* is available free to all USAF organizations as described below in the section "Is Your Organization Receiving Its Proper Number of *ASPJ* Copies?" Other US government and foreign military organizations may also receive the *Journal* for free by contacting the editor at aspj@maxwell.af.mil.

- Nonmilitary and nongovernmental organizations may receive the *Journal* by contacting the Superintendent of Documents by any of the following methods: writing to New Orders, Superintendent of Documents, c/o US Government Printing Office, P.O. Box 979050, St. Louis MO 63197-9000; calling (202) 512-1800 (voice), (866) 512-1800 (toll-free outside the DC area), or (202) 512-2104 (fax); or visiting http://bookstore .gpo.gov/collections/military_journals.jsp on the Internet. The *Journal*'s official designation is AFRP 10-1, *Air and Space Power Journal*, stock number 708-007-00000-5. The cost is $32.00 ($44.80 for international mail). Major credit cards are accepted.

Free electronic copy

- You can receive the *Journal* electronically by logging on to the "Subscription Center" at the Air Force Link Web site http://www.af.mil/subscribe, selecting any of the *Air and Space Power Journal* language editions, entering your name and e-mail address, and then clicking on the "submit" button. You will immediately receive an e-mail asking you to reply in order to confirm your subscription. You won't receive your subscription unless you reply to that message. Electronic subscription is free.

Is Your Organization
Receiving Its Proper Number
of *ASPJ* Copies?

The following criteria guide the free distribution of *Air and Space Power Journal* to military and government organizations. These criteria are only planning factors—not absolute limits. If your organization has different needs, please contact us at aspj@maxwell.af.mil.

- One copy for each general on active duty with the US Air Force or Air Reserve Forces.
- One copy for every five active duty US Air Force officers in grades second lieutenant through colonel.
- One copy for each US Air Force or Air Reserve Forces office of public affairs.
- Three copies for each Air Reserve Forces unit down to squadron level.
- Three copies for each air attaché or advisory-group function.
- One copy for each US Air Force or US government library.
- Other US military, US government, or foreign military organizations wishing to receive the *Journal* should contact us at aspj@maxwell.af.mil.

If your organization is not receiving the desired number of copies, please contact us.

Cumulative Article Index

A cumulative index of *ASPJ* articles, listed alphabetically by the author's last name, is available at http://www.airpower.maxwell.af.mil/airchronicles/ aspjindex.html.

The Editor

OUR CONTRIBUTORS

Lt Gen David A. Deptula (BA, MS, University of Virginia; MS, National War College) is deputy chief of staff for intelligence, surveillance, and reconnaissance, Headquarters US Air Force, Washington, DC. General Deptula completed ROTC at the University of Virginia as a distinguished graduate. He has flown more than 3,000 hours (400 in combat), including multiple assignments to operational fighter commands. He has significant experience in combat and leadership in several major joint contingency operations. General Deptula has twice been a joint task force commander, a joint force air component commander, and director of a combined air operations center. He also served as the principal attack planner for the air campaign during Operation Desert Storm. He has served on two congressional commissions charged with outlining America's future defense posture: the Commission on Roles and Missions of the Armed Forces and the National Defense Panel. Prior to assuming his current position, he served as commander of the General George C. Kenney Warfighting Headquarters in the Pacific. General Deptula is a graduate of Squadron Officer School, US Air Force Fighter Weapons School, Air Command and Staff College, Armed Forces Staff College, and National War College.

Maj Gen Larry D. James (USAFA; MS, Massachusetts Institute of Technology) serves as vice-commander, Fifth Air Force, and deputy commander, Thirteenth Air Force, Yokota Air Base, Japan. His staff assignments have included positions at Headquarters US Air Force, US Space Command, and Air Force Space Command. General James has commanded at the squadron and group levels. Additionally, he commanded the 50th Space Wing at Schriever AFB, Colorado. He also served as the senior space officer for Operation Iraqi Freedom at Prince Sultan Air Base, Saudi Arabia. Prior to assuming his current position, he served as director of signals intelligence systems acquisition and operations at the National Reconnaissance Office, Washington, DC. General James is a graduate of Squadron Officer School, Air Command and Staff College (top-third graduate), and Air War College (top 10 percent).

Maj R. Greg Brown (BA, University of Oklahoma; MS, Embry-Riddle Aeronautical University; MS, Air Force Institute of Technology; MS, School of Advanced Air and Space Studies) is an ISR strategist for the deputy chief of staff for intelligence, surveillance, and reconnaissance, Headquarters US Air Force, Washington, DC. Major Brown was commissioned through ROTC at the University of Oklahoma as a distinguished graduate. He has served as chief of intelligence for the B-1B Formal Training Unit, intelligence weapons officer for a composite wing and the provisional wing supporting Operation Southern Watch, and instructor at the USAF Weapons School. He has also served twice on the Air Staff. Major Brown deployed as the intelligence duty officer in the combined air operations center during Operation Enduring Freedom and again as deputy director for intelligence, Air Force forces, in the immediate aftermath of Operation Iraqi Freedom's major combat operations. He was the director of operations for the 609th Air Intelligence Squadron and has been selected to command the 547th Intelligence Squadron. Major Brown is a graduate of Squadron Officer School, USAF Weapons School, the Air Force Institute of Technology, and the School of Advanced Air and Space Studies.

Maj Michael H. "Hojo" Johnson, USMC (USNA; MMOAS [Master of Military Operational Art and Science], Air Command and Staff College), is currently the future operations officer, Marine Aircraft Group 26, Marine Corps Air Station, New River, North Carolina. He previously served with Marine Aviation Weapons and Tactics Squadron 1, Yuma, Arizona, as an AH-1W instructor pilot and subject-matter expert for joint close air support and joint forward air controller (airborne) (FAC[A]) issues. He is qualified as both a FAC(A) instructor and joint terminal attack controller. Major Johnson also served as a weapons and tactics instructor with Marine Light Attack Helicopter Squadron 369, deploying in support of Operations Enduring Freedom and Iraqi Freedom. He has over 2,400 hours as a pilot in AH-1W, UH-1N, AH-6M, AH-64D, F-18D, and F-16DG aircraft.

Capt Clinton R. Clark, USAF, retired (BS, MEd, Lamar University; MS, Air Force Institute of Technology), is a graduate student at Rice University in Houston, Texas. He previously served as current operations analyst at Headquarters Air Combat Command A9 (Studies, Analyses, Assessments, and Lessons Learned Division), responsible for developing and implementing operational assessment techniques; continuous process improvements; and identification, validation, resolution, and dissemination of lessons learned across the combat air forces. He has supported operational assessments for First, Seventh, Eighth, Thirteenth, and Fourteenth Air Forces. Captain Clark, a distinguished graduate of the Air Force Institute of Technology, is the 2005 Air Force Company Grade Analyst of the Year.

Capt Timothy J. Cook (USAFA; MS, Air Force Institute of Technology) is an executive officer at Headquarters Air Force A9 (Studies, Analyses, Assessments, and Lessons Learned). He previously served as the lead action officer for the combat analyst program at Headquarters Air Force, responsible for developing and guiding implementation of operational assessment models, procedures, and tools. He has mentored operational planners and assessors as they developed operational assessment plans for First, Seventh, Twelfth, and Fourteenth Air Forces. Additionally, he served on operational assessment teams supporting Operation Noble Eagle and Exercises Ulchi Focus Lens; Terminal Fury; Reception, Staging, Onward-Movement, and Integration; and Ardent Sentry. Captain Cook graduated in the top third of his class at Squadron Officer School.

Subscription to the *Air and Space Power Journal* for People Not Affiliated with the Military or Government

Copy this page, fill it out, and mail it along with a check or credit card number to

Superintendent of Documents
c/o US Government Printing Office
P.O. Box 979050
St. Louis MO 63197-9000

Make all checks payable to
Superintendent of Documents

OR

Fax your orders: (202) 512-2104

Phone your orders:
DC Metro area   toll-free outside DC area
(202) 512-1800   (866) 512-1800

Order online:
http://bookstore.gpo.gov/collections/military_journals.jsp

- -

Order Processing Code:
*5679

United States Government INFORMATION

❑ Yes, please send me _____ subscription(s) of the ***Air and Space Power Journal*** (AURE) for $32.00 each ($44.80 foreign).

The total cost of my order is $_____. Price includes regular shipping and handling and is subject to change. International customers please add 25%.

_____
Company or personal name   (Please type or print)

_____
Additional address/attention line

_____
Street address

_____
City, State, Zip Code

_____
Daytime phone including area code

_____
Purchase order number (optional)

***Charge your order.
It's easy!***

MasterCard   DISCOVER NOVUS

VISA   AMERICAN EXPRESS Cards

For privacy protection, check the box below:
❑ Do not make my name available to other mailers

Check method of payment:
❑ Check payable to Superintendent of Documents

❑ GPO Deposit Account ☐☐☐☐☐☐☐–☐

❑ VISA   ❑ MasterCard   ❑ Discover   ❑ American Express

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

☐☐☐☐ (expiration date)

***Thank you for
your order!***

_____
Authorizing signature   11/95

Important: Please include this completed order form with your remittance.

Left to right: Mr. Rémy Mauduit, editor of Air and Space Power Journal–Français; Col Jules Ndihokubwayo; Brig Gen Salvator Harushimana; Lt Gen Stephen R. Lorenz, commander, Air University; Brig Gen Vénérand Barendégéré; Col Jean Niyungéko; Col Nestor Ndarusanze; and Maj Gen Stephen Miller, commandant, Air War College, during the Burundian military delegation's visit to Air University (12 March 2008).